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CAR ACTION /93

Radio Control

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December 1993

CAR ACTION

THE WORLD'S LEADING R/C CAR MAGAZINE

Off-Road

World Champs

16-page
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Return
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TRACK TESTS

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Pirate RS

BOLINK
LTO Pro

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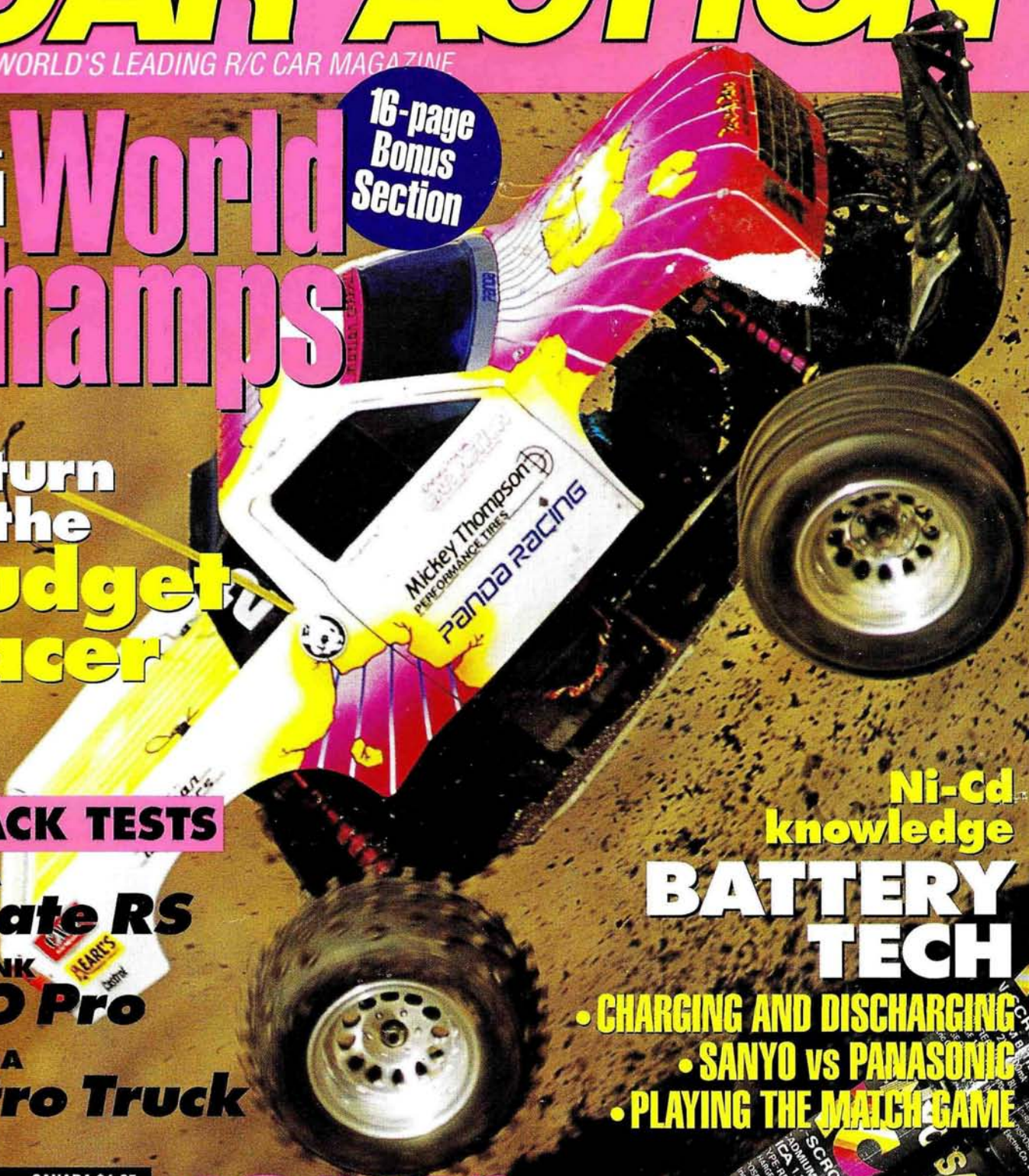
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LIGHT READING

RACING has become a large part of the R/C car hobby—a much larger part today than it was in the “boom” years of ‘86 to ‘88. I always cringe when I hear the word “sport” used in reference to R/C cars because there’s no physical exertion involved in R/C car racing. (Hauling 200 pounds of R/C gear to and from the track is



Masami Hirosaka epitomizes the serious racer. I've heard of matching batteries, but tires?

tough, but it doesn't really count.) And when I think of sports, I think of Little League dads and a “winning is everything” mindset.

My view on this subject has been somewhat altered as of late; having been to a number of large races this season, I can assure you that, to some guys, R/C car racing *is* a sport. From the preparation of their equipment to their intense concentration

on the drivers' stand, the effort put forth by the top drivers is on a par with that required in any competitive activity. Talent is also a key to success; I've seen many fathers who are veteran racers beaten by their novice children!

Clearly, there are two groups of R/C enthusiasts: those who view their activity as a sport and those who drive to relax and unwind. Because our magazine must appeal to both factions, our job becomes increasingly difficult as the interests of serious racers move further from the interests of beginners. This is why we try to strike a balance in our editorial content between hardcore and entry level.

Under ideal circumstances, all *Car Action* readers would read every feature, track report and column and find each worthwhile and interesting. As a testimony to the diversity within the R/C car hobby and the editorial content of *Car Action*, this isn't the case. Serious racers find our race coverage and technical articles more to their liking, and hobbyists probably find more value in our product reviews and basic how-to articles. We believe that a magazine that tries to appeal more to one group of readers than to others is bound to lose the interest of some groups. This is why we'll continue to cover all aspects of the R/C car hobby, so that every reader can find something that seems to have been written especially for him or her.

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Associate Publishers	YVONNE M. DeFRANCESCO GARY DOLZALL
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Magic Tricks

by Joel "Magic" Johnson®
current IFMAR
World Champion

Now that the cold weather has enshrouded most of the country, the R/C wars are being fought out there in the carpeted trenches—with 1/12-scale cars as the weapons of choice. Of course, those of you who have Revolver 12Ps already have a firepower advantage, and that will increase when you hook up with the new products listed below. To make the best 1/12-scale car even better, we have come up with a specially designed 4-cell-only chassis plate. This new graphite chassis is made for Trinity by ADC and uses our own proprietary formula weave and core material.

Besides being lighter and stiffer, the 4-cell chassis has wheelbase adjustments to dial your car in regardless of track conditions.

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With a new chassis plate, you should have a new "T" bar. The new "Orlando" T-bar is exactly what I used on my Revolver 12 to TQ and win the ROAR On-Road Nationals. We have added a couple of tweak-screw holes further down the bar which will stiffen it up and reduce the car's roll rate. The bar was also cut with the fibers at a 45-degree angle. This makes it flex differently and seems to make the car run much more smoothly. I would suggest both of these if you are going to Cleveland this Thanksgiving, or if you want to be the "Magic Man" at your home track.

RE1026 "Orlando T-Bar" \$6.99

Now for those of you who do not have Revolvers, we offer the "1/12-Scale Reactive Caster Suspension™" for your Associated 12Ls. This is the same front end, and it bolts directly to the Associated chassis—no fuss or muss. It's the easiest way to bring your old racer into the 20th century! Step by step pictures are included.

RE005 "12L Reactive Caster Suspension" \$49.99

Until next time,
Joel "Magic" Johnson®

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LETTERS

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Letters," *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

ERRATA

In the September '93 issue's "Racer News" section, we printed an incorrect telephone number for J.D. Beckwith's Duke Concept products. If you'd like to inquire about these products, call (510) 625-3134.

THE BIG SCREEN

Yo...Car Action; I really enjoy the magazine—the "Track Reports," races, how-to's, projects, etc. But there's something missing, especially from the race reviews. It's like someone telling me about an untelevised football game with 10 interceptions, 20 touchdowns and a sack that sent the quarterback into the stands. I'm told about it play by play, and I wish that I had been there to see it. I feel the same when I read your race reviews.

This is what I'm getting at: could you make video issues that show racing highlights and "lowlights" (collisions) with a commentary; track reports that show some of the points of difficulties in construction and the test runs; home-built projects and how they perform; and maybe even answer some "Troubleshooting" problems using "visuals" (actual cars and car parts)? I'd order a few of the videos. I'm sure that I speak for everyone when I say that all off-road enthusiasts would pay to see Masami drive with his feet or see Clausen reach 76mph in the Insane Speed Run. So, how about it?

LaDELL LAWRENCE
Houston, TX

OK, LaDell, for you and all our other faithful Car Action readers, we are now producing our own video—ActionTrax. It features not only national and international racing events, but also step-by-step technical instruction from the pros, info on the latest products, in-depth track reports, intriguing interviews and a slew

of other information. A new tape will be available every three months, and each will be 50 minutes long. Look for the order form elsewhere in this issue. JH

BIG-TIME RACING

I think the new MRC World Scale cars are awesome, but do you think that there will be any potential for a World Scale racing circuit? Also, will any other companies be making their own oversize electric cars?

LOUIE GALLUCH
Johnsonburg, PA

I really can't say whether or not there will be a World Scale racing circuit, but I really think there should be one. In a future issue, you'll see full coverage of the Trinity/MRC World Scale race held at the Ranch Pit Shop in Pomona, CA. The race was hot!

Right now, I'm working on transforming a mild-mannered Thunder King into a turf-tearing, ripping and screaming Baja King. And man, it's brutal. After a few trial runs with the beast, I can tell you that, with only a few minor hop-ups, these things can get around a track in a hurry. Stay tuned; my monstrosity will grace these pages soon.

As for other companies making their own "World Scale"-type vehicles...only the Ayatollah of Radio Controlla knows for sure, and he's not talking! JH

TRANNIES AND TRIBULATIONS

I own a Team Losi LX-T truck, and I love the way it runs and handles on all terrain. I recently bought the Hydra Drive with a slipper-clutch system to add to my stock tranny. These add-on tranny accessories work well, but the stock tranny just doesn't satisfy me. I've looked for the new A&L Lethal Weapon II for Team Losi everywhere, and I can't find it. Could you help me to find a distributor of this product? I've been a subscriber to this magazine for 2½ years now. It's great.

JOSHUA BUSICK
Paso Robles, CA

Well, Joshua, if you want more information on the popular Lethal Weapon trans-nies, contact A&L; you can call them at (714) 735-5249. JH

ESC CURRENCY

I recently bought a Tamiya Super Blackfoot, and I'm on the road to upgrading it. I need a speed controller, but I'm on a tight budget. Could you please tell me which speed controllers are good enough for a non-racer?

JUSTIN WYATT
Dillon, CO

Novak, Tekin, DuraTrax, Futaba, SCI, Traxxas and Hitec all make entry-level speed controllers. Since you don't race, you don't have to spend a ton of money for a hi-zoot racing ESC. Expect to spend anywhere from \$40 to \$70. Good luck! JH

SERVO SITUATION

I just wrote to tell you that you are the greatest. Oh, and one thing: what do servos do in a gas-powered car?

BEN DAVIS
Bladenboro, NC

Well, Ben, one of the two servos handles the steering; the other servo takes care of throttle and braking. Oh, and another thing: thanks for the compliment. JH

LITTLE BROTHER

Say what? There's a mini Inferno? Will it ever be available, or will it always be a prototype? I'm really interested! Please! I need info fast! Thanks for the colored "Readers' Rides"; they're definitely glorious!

ALEX STOERMER
Cincinnati, OH

Yes, Alex—and all you other nitro neophytes—there is a mini Inferno. It's not just a prototype; it's called the Inferno 10, and it should be available around December—just in time for the Christmas rush. JH

(Continued on page 176)



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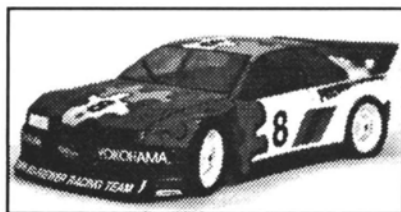


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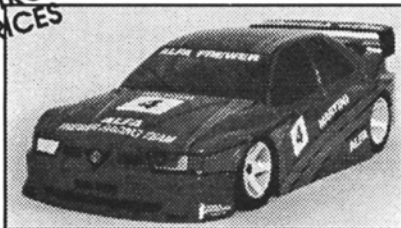
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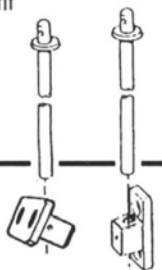
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Part no.—56301; price—\$600.

Tamiya America Inc., 2 Orion, Aliso Viejo, CA 92656; (714) 362-2240.



MIP Bones for Stock Losi Gearbox

Used by factory Losi drivers, MIP dogbones, which can be installed in minutes, give stock gearboxes more acceleration overall, and they improve stability and handling on rough terrain. Owing to popular demand, MIP also offer their famous bones in a longer version for

the Losi LX-T trucks. Kits include outdrives, bones and hardware.

Part nos.—MB-100, MB-2000; prices—\$28, \$30.

MIP, 746 E. Edna Pl., Covina, CA 91723; (818) 339-9007.



COMPOSITE CRAFT 10LSS PS-94 LTO Chassis

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Part nos.—10131 (10LSS PS-94 LTO), 10134 (10LSS PS-94 HBRT); prices—\$57.95 (10131), \$59.95 (10134).

Composite Craft, 7640 Commerce Center Dr., Orlando, FL 32819; (407) 351-6081.





ROBART MFG. Power Rev R/C Fuel Treatment

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in Robart Mfg.'s line of Snake Oil lubricants.

Part no.—SO-02; **price**—\$7.95 (4 ounces).

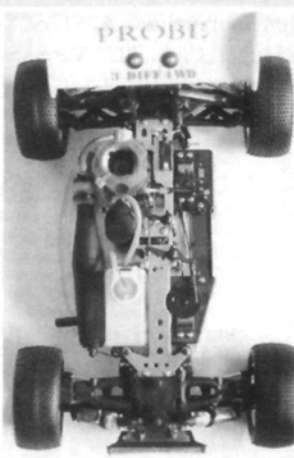
Robart Mfg., P.O. Box 1247, 625 North 12th St., St. Charles, IL 60174; (708) 584-7616.

RACER'S CHOICE Super Probe 21X

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Racer's Choice, 6N258 Acacia Ln., P.O. Box 405, Medinah, IL 60157; (708) 980-4863.



MRC Juice Pack

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King and the Desert Thunder. They have plenty of room, so why not go all out for full power by juicin' up with the Juice Pack? Worried about mounting it? No problem! A special set of front and rear mounts is supplied. Get the edge on the competition by packin' a Juice Pack in your next race.

Part no.—RB454A; **price**—\$89.98.

MRC, 200 Carter Dr., Edison, NJ 08817; (908) 248-0400.

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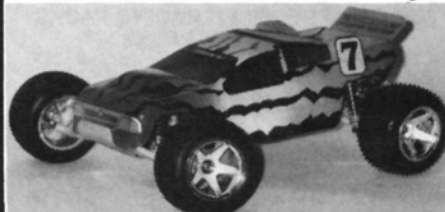


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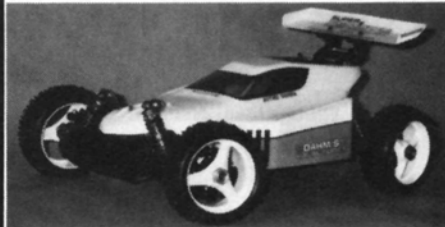
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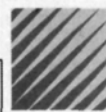
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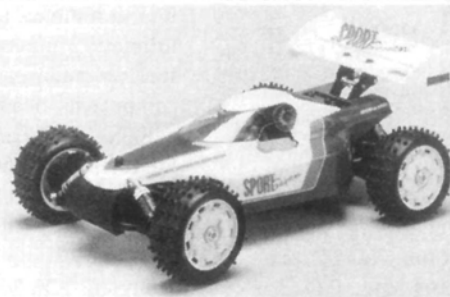
WHAT'S NEW

MUGEN USA Sport 7

The Sport 7 is based on the popular Mugen Toyota pickup truck, which was the first true, 1/8-scale, off-road 4WD racing truck. It's designed for beginner racers, but it can be upgraded all the way to Mugen's competitive '93 Super Sport off-road racing buggy.

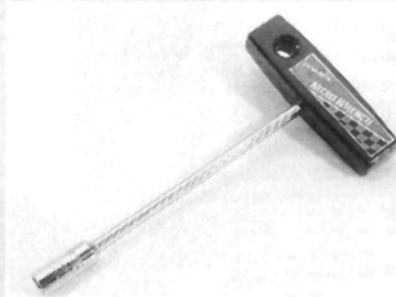
Part nos.—1002 (basic kit), 1003 (kit plus .21 rear exhaust, pull-starter engine); **prices**—\$391.99, \$558.99.

Mugen USA, 7021 Veterans' Ave., Brooklyn, NY 11234; (718) 251-7660.



HORIZON Dynamite Nitro Wrench

The Nitro Wrench, which has a long, 6-inch shank, is designed for reaching down into tall heat-sink heads to get at the glow plug. Chrome-plated for rust resistance and a sharp look, the shank is attached to its plastic-composite handle in a "T" con-



figuration, and the handle is impervious to fuel and motor spray. Its deep-socket, hexagonal shank end can be securely coupled to all standard glow plugs and it won't strip their threads.

Part no.—2510; **price**—\$7.95.

Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-0022.

QUANTUM R/C Ultra Bearing Lube

Made with a special blend of oils, Ultra Bearing Lube is designed to be used on bushings as well as bearings. By minimizing drag, this oil increases motor efficiency and increases bearing life.

Part no.—2000; **price**—\$2.99.

Quantum R/C Inc., 34 Washington Blvd., Commack, NY 11725; (516) 864-7043.



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INSIDE SCOOP



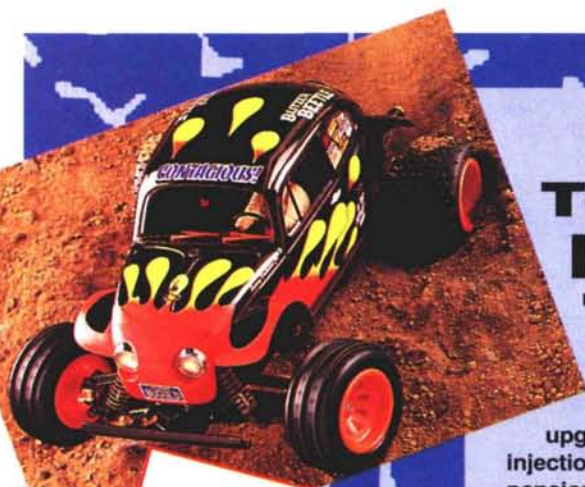
by CHRIS CHIANELLI

IN SEARCH OF FUN AND GLORY, 'CAUSE LIFE'S TOO SHORT TO BE A SHEEP!

FROM BEETLE TO JUICE

Here's a first look at two new offerings from Tamiya. At the top is Tamiya's latest entry-level 2WD off-road fun machine—the Blitzer Beetle. Aimed at novices, this low-cost Beetle-buggy has many of the features that made the entry-level Stadium Blitzer and the Bear Hawk not only durable, but also good enough to hold their own at the track. The Beetle can be upgraded and it features oil-filled, coil-over shocks; a rigid, injection-molded tub chassis; and long, double-wishbone suspension arms. The pole position should suit the Beetle quite well in a field of look-alike race trucks.

At the bottom is Tamiya's long-awaited entry into the world of "juice-machines." Tamiya's new GP (gas-powered) truck is powered by a pull-start .15 (2.5cc) glow engine, (manufacturer unknown at this point) and it has an aluminum chassis with a fiberglass upper radio plate and oil-filled, coil-over shocks. Updates on this new juice-burner will follow soon.



POINT BLANK Sets World Record

Flash!....Totowa, NJ. At this year's International Electric Drag Association (IEDA) Big Bucks Nationals at Kim's Pit Stop, Trinity/Point Blank Team driver Todd Putnam set a new IEDA Stock Class world record of 2.910 seconds elapsed time (old ET: 3.012 seconds) at a speed of 45.75mph (old record: 42.10mph). Todd used one of the new Trinity Slot Machine 2 stock motors (part no. RC2424). He also used full "lay-down" brushes (part no. RC4463) that had been broken in using Trinity/Revtech Break In Drops (part no. RC4469) before every run. A Team Trinity Pushed 1400SCR battery pack fueled Todd's dragster. Congratulations, Todd! *On the left you see a candid shot of Trinity president Ernie Provetti contemplating his competition!*



R/C FOR MOBILITY

The R/C event was so well-received at last July's Mobility Unlimited Fair '93 (put on by North Valley Rehabilitation Hospital in Chico, CA) that funding may be on the horizon for a hospital race team. The fair included activities such as a "celebrity" wheelchair obstacle course, wheelchair road racing, billiards demonstrations, "sit-skiing," bowling, golf, rugby and, of course, R/C car demonstrations. Naturally, *Car Action* was proud to support the fair.



BYRON RACE FUEL

Byron Originals brings its years of airplane-fuel-blending experience to the competition gas racing scene. According to Byron, Race 1000 (10 percent nitro), Race 2000 (20 percent nitro) and Race 3000 (30 percent nitro) have undergone extensive testing and reformulating over the past year in both the Far East and Central Europe. Byron Race formula is blended with proprietary lubricants developed by Klotz Performance Products. Byron Race Fuels will be produced in their state-of-the-art, computerized blend-

®

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And We've Won It All**



- ☐ IFMAR 1/10th, On-Road Modified World Championship - Joel Johnson
- ☐ ROAR 1/10th, On-Road, Modified National Championship - Joel Johnson
- ☐ ROAR 1/12th, On-Road, Modified National Championship - Joel Johnson
- ☐ 4-Cell Modified Winter National Modified Championship - Mike Blackstock
- ☐ U.S. Oval Masters Modified Championship - Mike Blackstock
- ☐ ROAR 1/10th Speedway Modified National Champion - Ernie Bucc

Trinity Team Pushed battery championships are all in super-competitive national and international modified pro-class racing, not in stock or regional events.

Trinity Products Inc., 1901 E. Linden Ave #8, Linden, NJ 07036 • (908) 862-1705 • Fax (908) 862-6875

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If you like racing your Tamiya and Kyosho F1 cars, but you *love* the looks of those all-American Indycars, Parma has something for you. This 1/10-scale Indycar body fits the Tamiya and Kyosho chassis with only minor, body-trim-line modifications. Designed to be used with the front and rear wings that come

THE INDY OPTION

with the kits, an extra Indy-style wing is also included. Its "generic" shape makes this new Parma body suitable for the many popular sponsor paint schemes and colorful logos for which Indy is famous. Thanks to Parma, you now have the Indy option for those fast F1 chassis!

Also on the way from Parma are two new sets of ground-foam tires that were designed specifically for the F1 parking lot racing that's sweeping the country. They are reported to be inexpensive and easy to mount. Watch for more Parma/parking lot updates here in the pages of the "Scoop"!



ing facility—the one that has been turning out the company's airplane, helicopter and boat fuels for the past few years. Available at you local dealer, or contact Byron Originals Inc., P.O. Box 279, Ida Grove, IA 51445; (712) 364-3165; fax (712) 364-3901.

Pro-Racer Silicone Shock Oil

"Whether you race at the North Pole or the new track in Hell, our oil stays true to weight."

TRINITY



\$2.99
All Weights

- Oil weight remains stable under increasing track heat, so suspension set-up won't change
- 1/2 weights from 10-70
- Allows precise tuning of your suspension to match changing track conditions

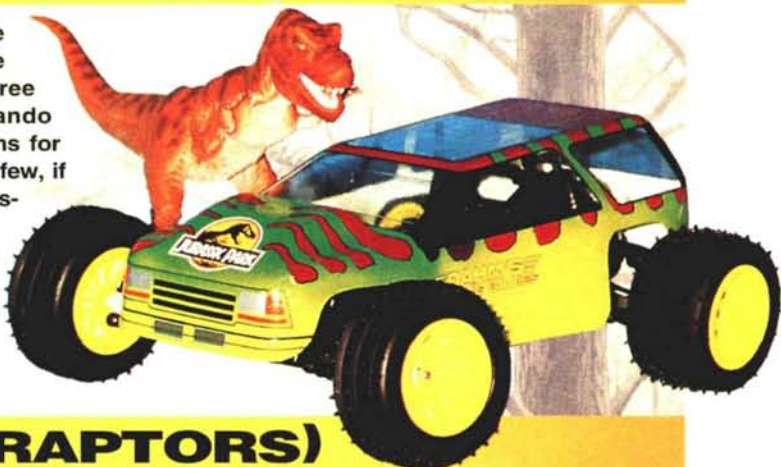


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JURASSIC PARKING

Remember the wild paint schemes on the Ford Explorer tour vehicles in that movie about dinosaurs everybody saw at least three times? Well, Dahm's new 1/10-scale Commando Explorer now includes photos and instructions for duplicating the scheme on those trucks. With few, if any, modifications to the original mounting system, this low-profile, narrow body fits most stadium race trucks, including the RC10T, LXT, JRXT, Stadium Blitzzer, Nitro Hawk, Blue Eagle, Outlaw Ultima and Outlaw Rampage. T-Rex will have a tough time catching this one! For a catalogue, send \$2 to Dahm's, Dept. RP, P.O. Box 360, Cotati, CA 94931.



(FOR OFF-ROAD RAPTORS)



KEEP THE PRESSURE ON

What a great idea! Davis Model Products' new Clip-Its is one of those, "Why didn't I think of that?" type of items. Never again will your engine fail you by sagging lean because of a disconnected muffler pressure tube. These sprung-steel fuel-tubing clamps are miniature versions of auto-hose clamps much like those found on English sports cars from the '50s and '60s. Clip-it clamps are a must with all types of positive-pressure fuel-feed systems. For more information, contact Davis Model Products, P.O. Box 141, Milford, CT 06460; (203) 877-1670.



PRO-LINE HAS VISION



Here's the latest addition to Pro-Line's performance line of off-road racing equipment: the Vision—a low-profile, "single-seater" buggy body. The Vision made its debut at the '93 ROAR Nationals where it was the choice of many Associated drivers. It has a left-side air scoop for speed-controller cooling, it fits the RC10 perfectly and, with minor cutting, it also fits the JRX2, the Pro-SE and the Ultima. For a limited time, Pro-Line will include—free!—one of their new Lexan wings.

Keep It Together

How many times have you pulled a peak charger out of your pit box and also yanked half-a-dozen other tangled up tools out with it? Saiko Racing Products' Peak Charger Case not only protects your charger, but it also keeps its wires neatly stored

where they can't be tangled with other things. [Editor's note: run the charger only while it's in the "standing" position in the case, as shown in the photo.] For more information, contact Saiko Racing Products, P.O. Box 1515, Tustin, CA 92681; (714) 642-4977.



Bear Necessity

PANDA

by BILL MOSS

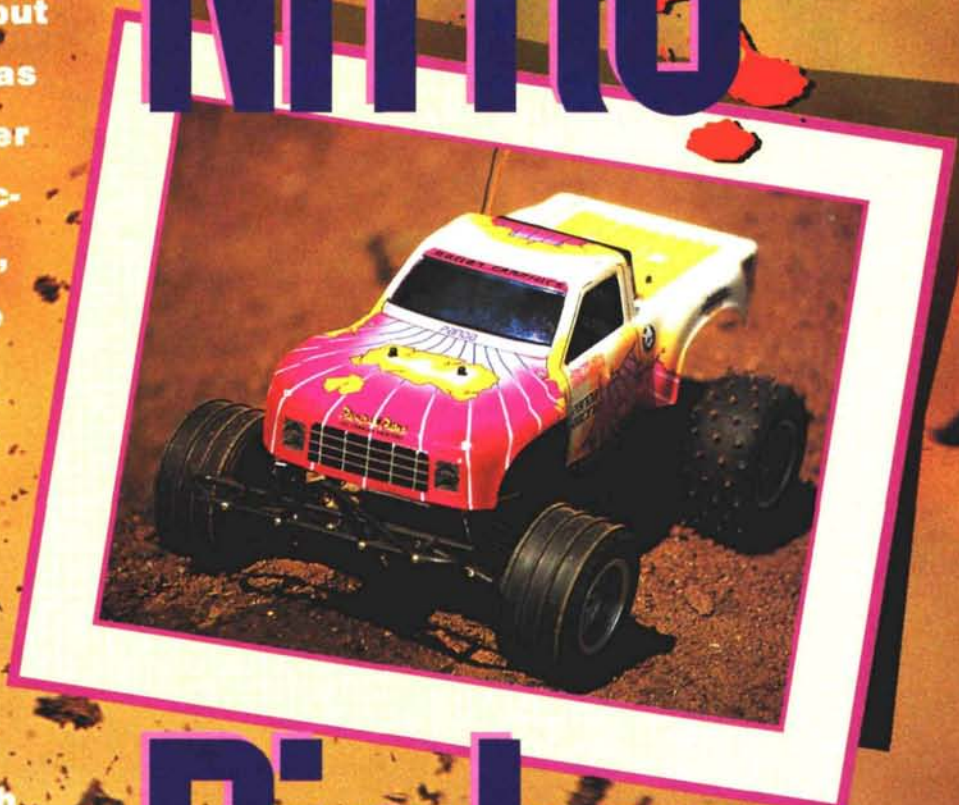
NITRO EXCITEMENT fills the air, and R/C gas vehicles in various scales have hit the tracks as well as the shelves. Once thought of as only a novelty segment of the R/C hobby, nitro power is now fully established. Numerous national and world championship races have been held, and outstanding drivers have taken the titles.



PHOTOS BY A. R. FLATBUSH

sity

NITRO



Pickup

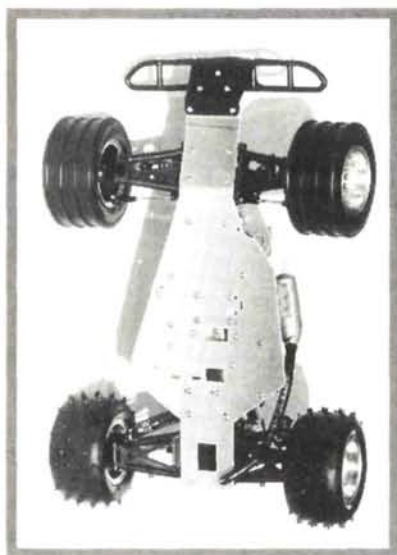
The 1/8-scale, on-road cars are always fast and furious, but off-road buggies are just as fast, and they add another dimension—flight—to gas racing. Recently, 1/10-scale, off-road gas trucks have become available. They resemble their electric-powered counterparts in their suspension and transmission design, but they are equipped with a .10- to .12-size, 2-stroke, nitro powerplant and a fuel tank instead of a 540 motor and a battery pack.

Panda*—a manufacturer of entry-level, electric-car kits—jumped into the world of nitro with its line of Magnum-powered vehicles. Their newest addition is the Nitro Pickup Race Truck. Its long-travel suspension and 2.2-inch racing tires make it Panda's best effort yet to manufacture a race-worthy vehicle.

Because this is my first gas-powered vehicle, I was eager to start assembly. Hey; wait a minute, this kit is 90 percent assembled. *Aargh!* Panda has the right idea, however; an almost-ready-to-run kit makes the transition from electric to gas easier for builders who are just getting into nitro. The powerplant, transmission and main suspension components were already installed, so I only needed to set up the steering and throttle/brake linkage, secure the wheels and tires, mount the electronics and paint the body.

PANDA PARTS

The Panda Nitro Pickup has a stamped, T6-aluminum chassis plate that serves as an effective heat sink for the engine. There's also an aluminum upper chassis deck above the steering system; this is combined with a steel-rod chassis stiffener that runs from the rear bulkhead to tie the



The Panda truck comes with a stamped T6-aluminum chassis that doubles as an effective heat sink for the engine. The suspension arms are made of fiberglass-reinforced nylon.

whole thing together and ensure a stiff foundation.

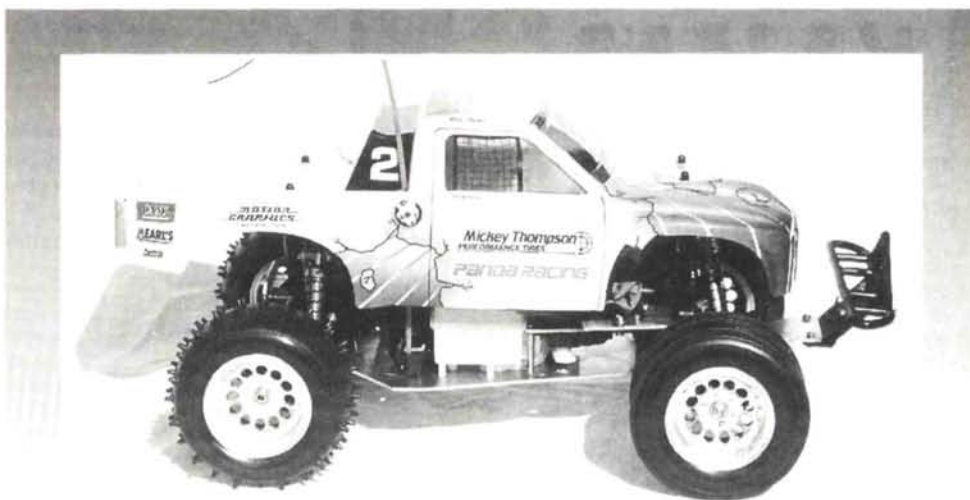
The steering system is a sturdy bellcrank design with a built-in servo-saver. The steering servo is mounted upside-down on the upper chassis deck, and it's connected to the steering bellcrank with a thin tie rod. The Z-bend on the servo connection and the ball link on the steering connection puzzled me. Why not just use ball links at both ends? Go figure!

SUSPENSION

The suspension begins with black, fiberglass-reinforced, nylon A-arms; although its arms aren't as long as those on most race-bred trucks, I think the suspension will perform adequate-

ly. Hub carriers with approximately 15 degrees of caster hold large spindles that are similar in design to those of the Losi LX-T's. Long steel axles with aluminum locknuts hold the wheels in place.

Long, red-anodized, oil-filled aluminum shocks span the area between the arms and the shock towers. Unfortunately, I have two problems with them. Instead of using conventional one- or two-hole plastic pistons, Panda supplies solid, non-removable, metal ones that use a "flow-around" principle. In this design, the oil must flow *around* the piston (instead of flowing through the piston valves in it). There isn't enough free movement to allow smooth damping, and the suspension is too stiff. For a quick solu-



PANDA NITRO RACE TRUCK

Scale1/10
Price\$350

DIMENSIONS:

Overall length17.32 in.
Width11.22 in.
Wheelbase10.39 in.
Front track9.25 in.
Rear track8.87 in.

WEIGHT:

Gross4.12 lb.

CHASSIS:

TypePlate
MaterialAluminum

DRIVE TRAIN:

TypeGear
PrimaryClutch bell/gear reduction/spur
Transmission3-gear
Differential(s)Bevel gear
Bearings/Bushings ..Oilite bronze bushings

SUSPENSION:

F/R: Type ...Lower A-arm, upper camber link
DampingOil-filled, coil-over shocks

WHEELS:

F/R: TypeOne-piece plastic
Dimensions (DxW)2.2x2 in.

TIRES:

FrontRibbed
Rear5-row medium spiked

POWERPLANT:

EngineMagnum GP .10 BXL
CarbRotating valve

OPTIONS TESTED:

Power Master* fuel (15 percent nitro); JR Propo Beat Gear radio system; Futaba 4-cell battery holder; Thunder Tiger* rechargeable Ni-Cd starter.

HITS

• Low price • Comes with engine • 90 percent assembled

MISSES

• Shocks inadequate for nitro power • No ball bearings





Panda Mods

Even though most R/C vehicles are designed to be ideal out of the box, all designs can be improved. Here are a few of my modifications to the Nitro Pickup.

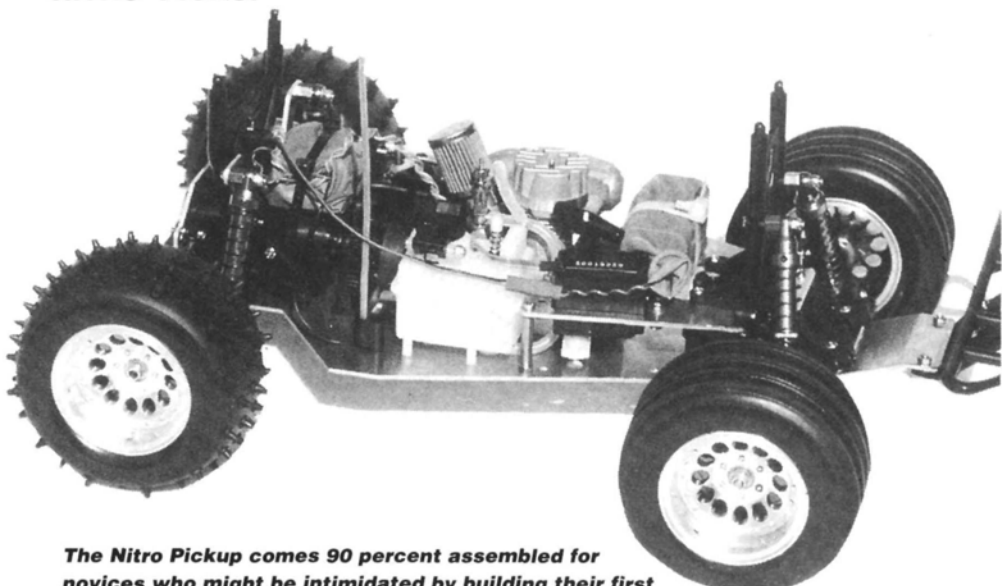
- The muffler on the Magnum GP .10 BXL faces forward (the exhaust exits toward the front of the truck). Unfortunately, the exhaust vapors fall right into the path of the rear tires, so they foul up the traction and make a big mess.

To solve this problem, I reversed the muffler, attached a long piece of tubing to the exit pipe and routed the tube through the rear A-arm to make the vapors exit behind the truck. When I tried to reverse the muffler, I found that the throttle servo was in the way, so I went to the Magnum parts rack and picked up a muffler extension. It's a simple piece of aluminum that extends the muffler about $\frac{3}{4}$ inch—just enough to make it work!

- After I had extended the muffler, I realized that the linkage for the muffler's baffle assembly wouldn't operate properly. I talked with my friend Matt Holbo, the resident nitro guru at Hobby Shack/Global Hobby. He explained that when you extend the exhaust tubing this much, you don't need a baffle.

As I inspected the truck's parts, I noticed that because of the new gear reduction unit, the engine has been moved to the right (toward the fuel tank) about $\frac{1}{4}$ inch. Unfortunately, Panda didn't re-machine the upper chassis deck to compensate for this, so it protruded far enough to interfere with the pipe. No problem; I got my trusty Dremel* out and a grindin' I went.

NITRO PICKUP



The Nitro Pickup comes 90 percent assembled for novices who might be intimidated by building their first nitro-powered vehicle. All you have to do is set up the steering and throttle/brake linkage, bolt on the wheels and tires, mount your receiver and battery pack, paint the body and add fuel. You're ready to run!

tion, I drilled small holes in the pistons to allow them to move through the oil with less resistance.

Also, the shock bodies are almost too narrow to allow enough oil to enter them, so shock bleeding is a difficult task. Because the bodies are narrow, I haven't found springs that will fit.

The Panda Nitro truck costs only about \$229 (including the engine), so unless you plan to race, I suppose the shocks are adequate.

MAGNUM MANIA

Global Hobby Distributors* is the exclusive U.S. distributor of Magnum engines and Panda car kits, so naturally, they supply the Pickup Race Truck with the latest version of their .10 engine—the GP .10 BXL. This engine has some new features that include an improved, bolt-on, pull-starter system that replaces the old problem-prone, snap-on unit. Other, more subtle improvements to the GP include a thicker, stronger fuel line and a newly machined crankshaft that eliminates the need for a separate clutch nut.

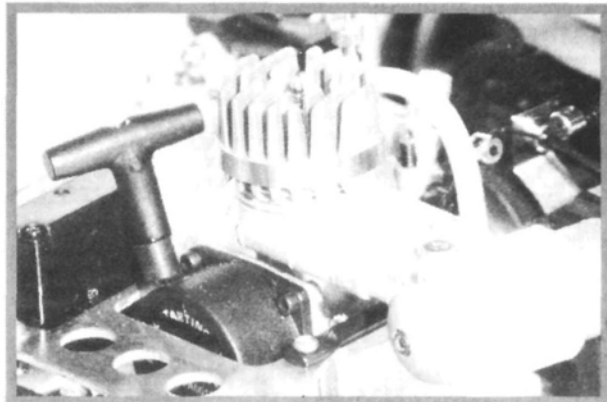
I sealed the muffler with Permatex high-temp RTV (available at most hardware stores), because fuel and exhaust vapors can escape through even the smallest gaps between metal parts. The full-size automotive

world uses this red gook to help make gaskets for engine parts (valve covers, etc.). The GP .10 comes with a standard rotating-barrel carburetor that's sealed with a rubber O-ring, so the RTV sealant didn't seem necessary here. Just to be safe, I check the O-ring after about every 10 runs.

DRIVE TRAIN

A standard, two-shoe centrifugal clutch is connected to the GP .10 BXL's crankshaft. The clutch drives an all-new gear-reduction unit that gives the Panda more off-the-line punch. The gear-reduction unit drives the main spur gear, which drives the transmission input shaft.

The tranny uses a gear-type differential. It's a 32-pitch diff gear filled with three spider gears that mesh with two bevel gears. At first, I thought a ball-diff upgrade



The Panda Nitro Pickup is powered by a GP .10 BXL engine. The engine features a newly machined crankshaft and an improved, bolt-on, pull-starter system that replaces the old snap-on unit. The engine is extremely reliable.

was in order, but after re-evaluating it, I realized that the centrifugal clutch on the engine would take care of most of the wheel spin. After all, if a gear diff is good enough for 1/8-scale, off-road buggies, it's good enough for me! Even though the tranny was already assembled, I disassembled it to make sure everything was lubed and working properly.

Steel outride cups, dogbone drive shafts and axles round out the drive line. It seems sturdy enough for ground-pound-ing, nitro-burnin' action.

GETTING CONTROL

To get this truck moving, I use a new JR Remote Control* radio system—the Beat Gear. It's an entry-level stick radio with a comfortable, computer-designed case. The Beat Gear comes with two standard servos and an ABC&W (anti-blocking, cross-modulation and window) receiver. The radio uses eight AA dry cells to power the transmitter and four AA dry cells to power the servos (rechargeable Ni-Cds are optional). Because this radio was designed for electric cars, it uses a BEC (battery-eliminator circuit); so a 4-cell holder wasn't included. No problem; I just strolled down to a hobby shop and picked up a Futaba* unit.

The throttle- and brake-linkage assemblies go together fairly easily. Thin steel rods accompanied by springs and locking collars make up the linkages, while a large four-sided Airtronics* servo horn ties it all together. (Unfortunately, the Beat Gear radio's servo horn wasn't large enough). Luckily, JR Propo uses a servo output shaft that's the same size as the Airtronics one.

The brake system consists of a strip of thin brass that has been curved into shape and bolted to the chassis. A small fiber pad is servo-taped to the brass. The pad contacts the clutch bell and slows the car. Although the brake system works quite well, I'd love to see a disk-brake unit incorporated into the truck. (What can I say; I love high-tech stuff!)

AESTHETIC ATTRIBUTES

The Pickup Race Truck body is modeled after a Toyota stadium racer. To make finishing easy, Panda includes a large decal sheet that offers several "sponsor" decals (Valvoline, Simpson, etc.) and large orange/yellow sidewall graphics.

But I wasn't in the mood to battle with spray cans and masking tape, so I sent the

(Continued on page 143)

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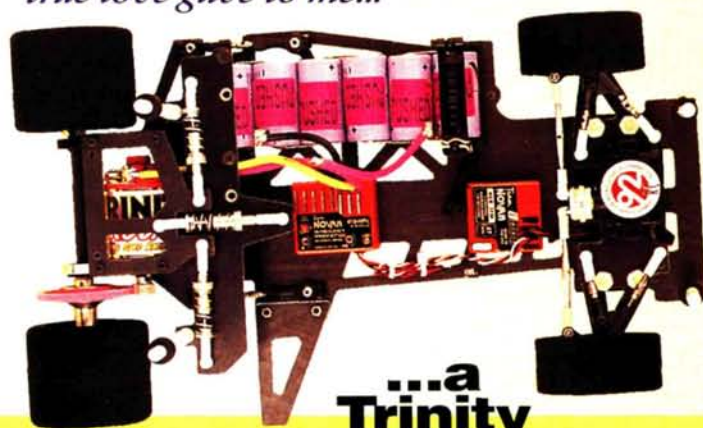
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PASADENA • ORLANDO

On the first day of Christmas my true love gave to me...



...a Trinity EV10ss from Uncle Ernie.

If you've been really good this year, Santa might bring you an EV10ss, so you, too, can enjoy the thrill of burning up the superspeedway.

The EV10ss has everything you'd expect on a top-line racer—like ball bearings and a graphite chassis, plus many extras that have helped it become the winningest oval car of the '93 racing season. Reactive caster front suspension, with its adjustable caster and camber, and race-proven Triad rear suspension help the EV10ss adapt to virtually any track surface quickly and easily so you'll never be "dialed out!"

On the second day of Christmas my love gave to me...

...Two Kyosho Parking Lot Racing Setups.

You say you love R/C car racing, but spending all day at the track is an impossibility? Have we got something for you! Parking Lot Racing is something you can do on *any* paved surface, and you can get in on the fun with this 1/10-scale Lola T-9300 Indycar kit and Lap Boy automatic lap-counting system from Kyosho.

The Lola is an inexpensive, high-performance electric racecar that throws in a dose of scale accuracy for good measure. The kit comes with everything you need to duplicate Arie Luyendyk's '93 Indy pole-sitting car, or you can paint it to match your favorite Indycar.

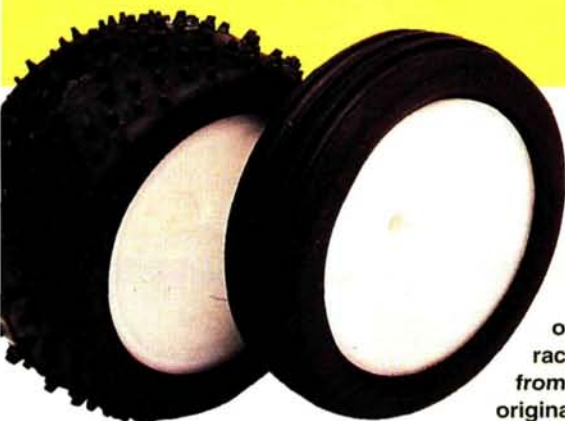


Christmas Wish List

If, despite the season, there's *never* enough merriment under your mistletoe, isn't it time to toss our wish list under the noses of people who might just pop for a present or two? What do you have to lose?

On the fifth day of Christmas my true love gave to me...

...Five One-Year Supplies of Pro-Line Tires.



What serious racer couldn't use a full year's supply of tires? Pro-Line manufactures a complete line of tires for both off- and on-road racing. They range from Pro-Line's original "Fuzzy" off-road tires to the new

line of Jaco mounted and trued foam tires.

Additionally, many of Pro-Line's popular off-road tire designs can be bought in the super-soft XT-R rubber compound that gives extra grip on slippery tracks.

On the sixth day of Christmas my true love gave to me...

If you believe that bigger is better, then give this new 1/6-scale off-road buggy from Traxxas a serious look. Unofficially dubbed the "Traxxasaurus," this buggy gets its power from a 26cc Mitsubishi 2-stroke gas engine that can propel the 26-inch-long dirt burner to speeds in excess of 25mph! This big buggy's suspension can be adjusted just like those of most smaller vehicles. Caster, camber and toe-in can be set to match running conditions, and four large-volume, oil-filled shocks provide damping that should keep all four tires in firm contact with the ground—except over the



...Six Traxxas 1/6-Scale Buggies.

really hairy jumps!

On the third day of Christmas my true love gave to me...



...Three Team Associated New Gas Trucks.

Get involved in the newest category of R/C racing with this new, $\frac{1}{10}$ -scale, gas racing truck from your friends at Team Associated. This item is sure to be on many "I want" lists this Christmas and for good reason: what could be more fun than a gas-powered version of the popular RC10T stadium truck?

Especially designed to accept .12 to .15 engines, the "Nitro-T" has an aluminum chassis that acts as a heat sink, Associated's proven ATC slipper-clutch system, and a super trick braking system. Add to these a set of tires made specifically for this truck by Pro-Line, and you've got a sure-fire winner on your hands.

On the fourth day of Christmas my true love gave to me...

...Four Team Losi Double-Xs.



The car that TQ'd at the '93 IFMAR World Championships may well end up under your tree this Christmas. Sharing very little with its predecessor, the JRX-Pro SE, the Double-X features an all-new, molded chassis, improved suspension geometry and a modular rear end for easy maintenance. Plus, you get a reconfigured version of Losi's Double-X tranny (its gears are less upright so the motor sits lower and more forward), a Hydra Drive unit, and trick 2.2-inch, 22-Caliber wheels and tires.

North Pole Plunder

On the seventh day of Christmas my true love gave to me...

...Seven MRC Baja Kings.

It's not $\frac{1}{10}$ scale, and it isn't $\frac{1}{8}$ scale, but I can tell you that MRC's World Scale is a load of fun! The Baja King is a top-of-the-line racing truck, and it's jam-packed with high-performance features that some $\frac{1}{10}$ -scale racing trucks don't even have. Not one but two electric motors motivate this beast, and with its full

ball bearings, it's the fastest of the three World Scale rides. Add to this a racing-type ball diff and a friction slipper clutch, and you have a truck that is just as at home on the track as it is tackling backyard obstacles.



On the eighth day of Christmas my true love gave to me...

...Eight Novak Rooster ESCs.



With the release of its new Rooster reversing electronic speed controller, Novak proves that it hasn't forgotten the needs of beginners. Novak's new microprocessor-based controller is also one of the most user-friendly units available. To set the Rooster, you simply turn everything on, press the One Touch setup button (no potentiometers here), pull full throttle and full reverse on the transmitter, and you're ready to go out and throw some mighty roosts! At an entry-level price, Novak's got a sure winner on its hands.

Christmas Wish List

On the ninth day of Christmas my true love gave to me...

...Nine Tekin BC112A Chargers.



Tekin's newest battery charger is also its most user-friendly model. Instead of a multitude of small dials and buttons, the 112A lets you choose from among four charging methods (Timed, Peak, Power-Flex and Trickle) by scrolling through the menu on the unit's LCD screen. Also, owing to its 33kHz power supply, the BC112A operates coolly enough not to require a heat sink. An AC-powered version with 10A output, called the BC112D, is also in the works and should be available soon.

On the tenth day of Christmas my true love gave to me...

...Ten Bolink Diggers.

Talk about back to basics! Bolink's Digger brings fun and simplicity back to the R/C car hobby with a bang. The simple part is the design of the Digger's chassis—two FRP side plates that tie the solid rear-axle suspension to the rigid front suspension. The fun part comes from the Digger's wheelie bars and near indestructibility, which allow it to perform all sorts of neat tricks. Wheelies?

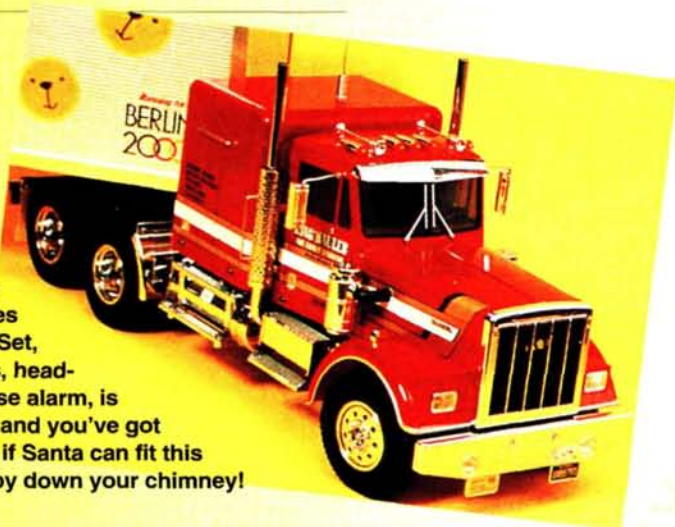
Aw, it does great wheelies!



On the eleventh day of Christmas my true love gave to me...

...Eleven Tamiya King Haulers.

This authentic-looking, 1/14-scale tractor trailer is more than 2 feet long and is an incredibly accurate replica of the 18-wheel kings of the road. A 3-speed transmission comes with the truck, and Tamiya's Tractor Trailer Electrical Unit Set, which includes automatic directional and hazard lights, headlights, brake lights, running lights and an audible reverse alarm, is sold separately. Add the optional 34 1/2-inch Semi-Trailer, and you've got over 4 feet of R/C road hog. Let's see if Santa can fit this baby down your chimney!



On the twelfth day of Christmas my true love gave to me...

...Twelve ESP Clod-A-Leaver Suspensions

The ultimate in suspension for your Clod Buster comes from ESP. Designed to mimic the performance and appearance of the chassis and

suspensions of full-size monster trucks, the

Clod-A-Leaver system features cantilever-type shock mounting and enough wheel travel to traverse the most gnarly obstacles with ease.

With the Clod-A-Leaver on your truck, it'll be a crushin' Christmas for sure! ■



ATTENTION READERS! Here's your chance to win one of the fabulous items on our Wish List and get your ideas into print! Just send a letter telling us what your dream *Car Action* article would be, and which item on the Wish List you'd like most (just one, now!). We'll choose the winner according to the creativity, detail and originality of the ideas expressed.

Send your letters to *Car Action* Wish List, 251 Danbury Rd., Wilton, CT 06897. All entries must be received by February 1, 1994. Good luck!



R/C DOCTOR

by DOUG MERTES

Fun With Lexan!

HOW OFTEN HAVE you had to fashion some small part for your R/C car? You know what I mean: not something complicated, such as a new gear case, or a hub, or an axle, but some little piece that really makes life easier for you as a racer or a hobbyist. Have you ever tried to work with Lexan? It's light, amazingly tough, non-conductive, easy to form and paint and, best of all, it's cheap!

With just a single sheet of Lexan polycarbonate, a few hand tools and some practice, you can duplicate the items described in this article—and I'll bet that there are a lot more ideas out there that could be shared with our readers!

Flat polycarbonate sheets can be found in most hobby shops or craft stores. Andy's, Bolink and Custom Works sell it to the dirt-oval bunch for side-dam material, and for just a few bucks, you can usually get enough to make parts for several cars.

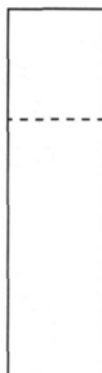
You don't need any fancy tools, either. With curved and straight scissors, needle-nose and slip-joint pliers, a variety of drill bits and an X-Acto knife, you can produce a finished product that will be the envy of your pit mates!

Remember, too, that a little planning goes a long way. Sometimes it's easier to cut a pattern out of paper (like the ones shown here), fold it into the proper shape, check the fit and then flatten it out again. Mark the creases using a pencil, and transfer the pattern to the Lexan.

Ready? Then, let's get started!

Fig. 1

Bend 20°



Battery Tape Leader

This is an easy one. Cut a 1/2x2-inch piece of Lexan. At one end, bend 1/2 inch at a slight angle. When you install battery packs in your pan car, stick the straight part to the end of the piece of tape. Now, it won't bend over and stick to itself—or to you!

Eliminate ugly transponder holes in your bodies!

This one takes some planning because not all transponders are the same size. If you race at tracks that have different systems, you might want to make several and keep them in your pit box. The idea is to put the transponder on the chassis where its weight will do you the most good. Experiment!

Fig. 2A

Transponder Mounts

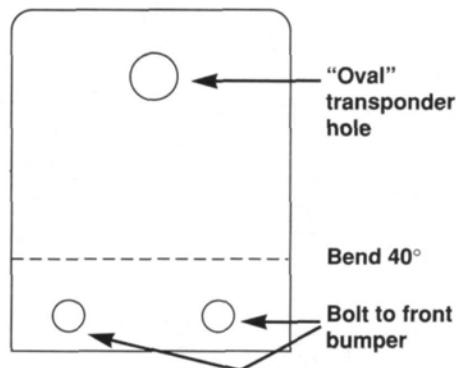


Fig. 2B

"On Road"

Servo tape to flat-mounted steering servo



Fig. 2C

"Off Road"

Servo tape to chassis; protects transponder from side impact

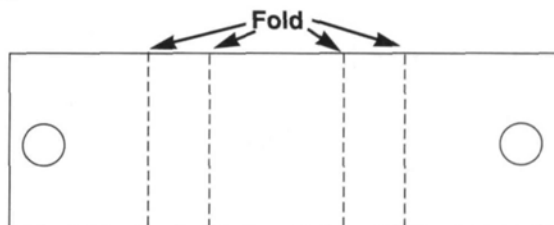
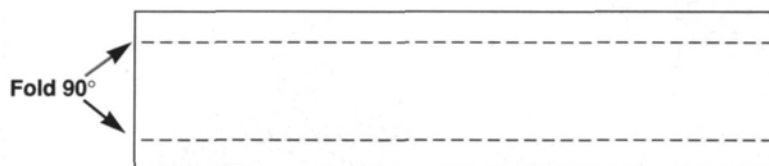


Fig. 3

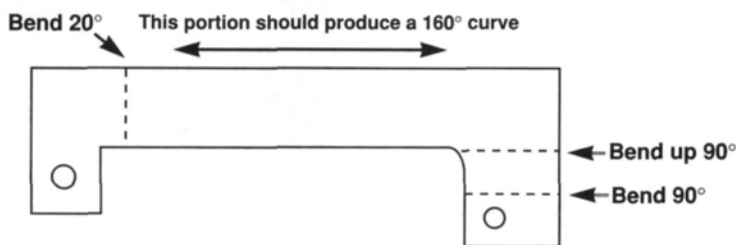
LTO Battery Bridge



For racers who enjoy both roadcourse (using saddle packs) and oval (using LTO packs), but who want to invest in only one battery configuration, this little rascal works wonders! Start with a 5x1-inch piece of Lexan. Using slip-joint pliers, bend a 1/4-inch ridge lengthwise on each side. Put your saddle packs in place (LTO-style), and place the bridge over the batteries. Then tape it and the batteries together. (The ridges keep the tape from sliding off.) The bridge holds the batteries down and prevents them from bouncing out of your car.

Fig. 4

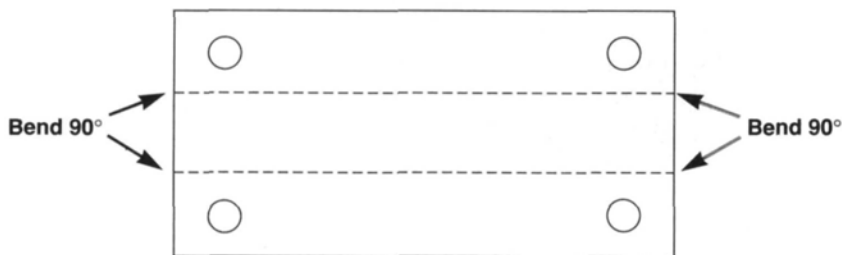
Spur Gear Protector



Did you ever get whacked in the rear right off the line by some would-be 'holeshot king'? This item won't keep you from getting hit, but it should protect the spur gear! This is a good example of a piece that requires a paper pattern. Since not all spurs are the same, you'll probably want to keep several protectors of different sizes in your pit box.

Fig. 5

Body Post Brace



Do you find that the left rear wheel cutout on your oval car turns black from tire dust where it contacts the tire, even though it looks as if there's sufficient clearance when you're in the pits? It could be that your rear body posts are actually leaning toward the outside during turns, causing the body to pull over the foam part of the rear wheel. By bracing the body posts, you'll eliminate drag on that tire and pick up some speed coming out of the turns!

I've seen Lexan used for aero-disks, battery straps, spoilers, bug shields, dust covers and a lot of other useful bits. All it takes is a little time, ingenuity and experimentation. Does anybody out there have any more ideas? If so, write to me (R/C Doctor, c/o R/C Car Action, 251 Danbury Rd., Wilton, CT 06897).

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TROUBLESHOOTING

by JOHN HUBER
ILLUSTRATIONS by STEVE COLLINS

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Wilton, CT 06897. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

One Way To Go

After racing several 2WD cars, I decided to try 4WD, and I bought a Top Force Evolution. In the front gearbox, there's a one-way bearing that allows the

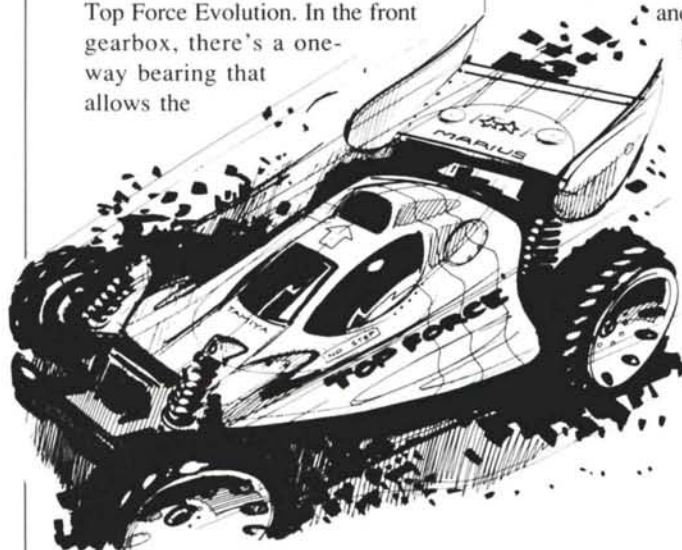
front tires to freewheel. What are the advantages and disadvantages of this, and how does it affect the car's handling?

MARIUS BERG
Jakobsli, Norway

A one-way drive system will change the handling of a car in many ways. First, the rear end receives full power on command for fast acceleration. The rear wheels can handle the power because weight is trans-

ferred to the rear under acceleration. The front wheels also get full power, but once the car is up to speed, they're able to "freewheel" using very little power, if any. Once into a turn, the front wheels will help to pull the car through.

With a conventional gear or even a ball-type center diff, power can be wasted as the front wheels "unload" and weight is transferred to the rear of the car. This doesn't happen with a one-way system. With a one-way system, the car will brake like a 2WD car. Only the rear tires will grab, allowing fishtailing and sliding. Basically, the one-way system makes a 4WD car act like a refined 2WD car with lots of steering.



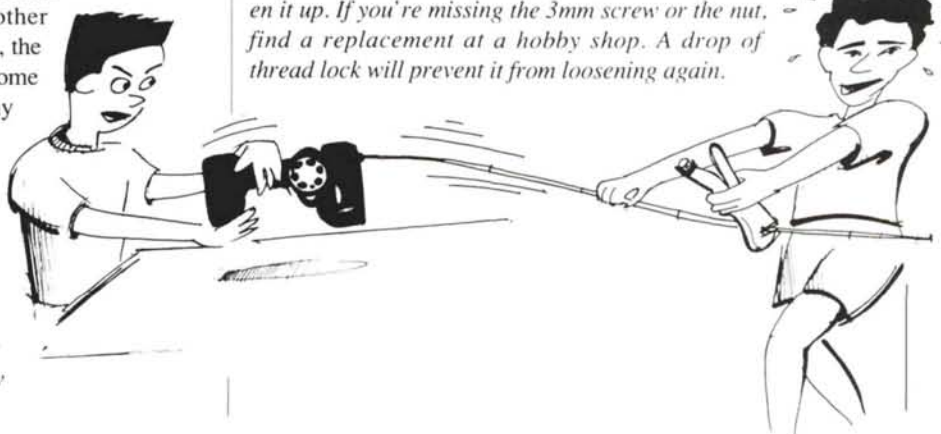
Futaba with a Screw Loose

I ordered an Outlaw Ultima racing truck with everything to run it out of the box. I've had my controller for about a month. It's a 2PB Magnum Sport and, to run the truck with it, you have to screw the antenna down through a hole and onto another screw at the bottom of the hole. Well, the screw at the bottom of the hole has come loose. I messed up and didn't send my warranty card. Could you tell me if I could take my controller apart and tighten the screw? Thank you for your time and information.

BRIAN NELSON
Laurens, SC

Brian, it's easy to fix the controller yourself. You'll have to take out a few

screws on the back of the transmitter to open it. I suggest that you draw a simple picture of the back of the radio. As you remove a screw, stick it into the paper in a matching position. This way, you'll be able to get the screws back in the right places. With the back off, look for the loose screw. It should be tightened to a metal tab on the printed-circuit board with a 3mm nut. If everything is there, just tighten it up. If you're missing the 3mm screw or the nut, find a replacement at a hobby shop. A drop of thread lock will prevent it from loosening again.





Motor Meltdown

was smoking, and the solder on the motor had melted! The Novak 410-M5 controller, the wires and the batteries were all burning hot. I also had a 4-minute run. I usually get 6 to 8 minutes. What's the problem? Please answer; I don't know what else to do.

DAVE WARTON
Ridgewood, NJ

It sounds as if your motor needs some attention! Very worn brushes and a dirty commutator will produce a lot of heat. Check these things first and, if needed, get the comm cut at a hobby shop. If the comm isn't too worn, try polishing it with a comm stick, and then buy new brushes. The other possible cause is some sort of binding. Remove the motor, and make sure that the tranny's action is smooth and free. A blown bearing can also add a lot of drag and put undue load on the motor. When you re-install the motor, make sure the gear mesh isn't too tight.

I have a Team Losi

JR-X2, but I haven't run it for about a month. I took it out today with two Sanyo, N-1400, SCR, 7.2V, 1400mAh batteries and ran them both. After I had run them both, I went to pick up my car. I saw that my Psychotic Reaction motor

Slipped Diff

I've been involved in R/C for three years, and I now own a great Team Car that has outdriven my competition until recently. It has a Novak M5, a Futaba radio system and a Futaba servo. I run a Slot Machine motor in stock and a Mr. T in modified. The car is set up according to your "Team Car Setup" article (R/C Action Series *Dirt Action '93 Special*). My diff has been putting me through hell lately, and I hope you can help me. It was originally built to the instruction manual's specifications (1/8 turn from fully compressed). At this setup, the slipper clutch slipped for 18 inches under hard acceleration, and the diff didn't slip at all. About a month ago, I noticed that the diff loosened while I was driving. I took apart the tranny and the diff—as I do every five runs—and rebuilt it. Back on the track, it loosened immediately, so that the diff slipped instead of the slipper.

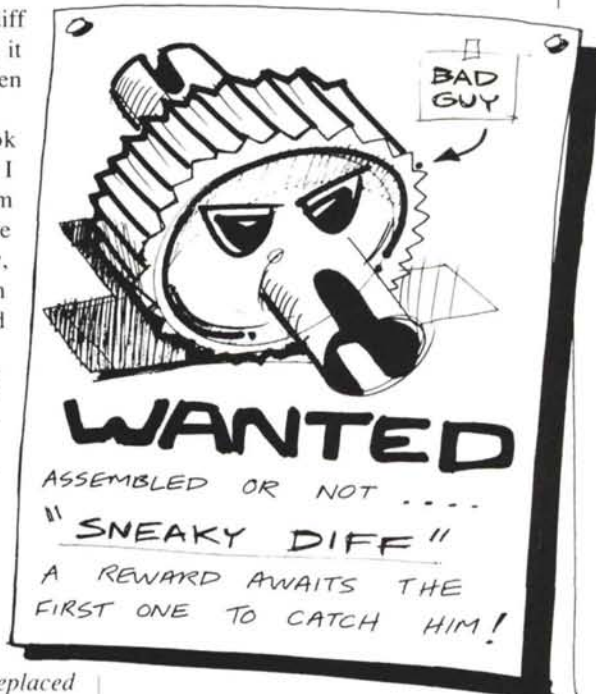
That time, I tightened the diff so that it was compressed all the way and gave the car a spin. It ran well for a few laps, and then it loosened as it had before. I took the diff apart,

cleaned it and replaced the diff screws and rings. After that, it ran well for one run, and then the problem recurred.

The diff's parts still look new when I take it apart, so I don't know what the problem is. This pesky diff has kept me off the track for a while now, and I need all the help I can get. Thanks for your time and your great magazine.

TAYLOR MORAN-GATES
Concord, MA

I hope that you're replacing the diff screw and nut when you rebuild. As you tighten the diff, the diff screw cuts threads in the plastic nut. It will be tight at first, but the more you rebuild it, the more it will loosen. If you replaced the screw and nut and the diff still became loose, you might want to try some thread lock. Start with the medium stuff, then try the heavy-duty, if necessary. You might also try a slightly longer screw that will protrude



more from the nut. This way, the screw could be locked with compound from the outside. Make sure, however, that it doesn't interfere with the dogbones.

Bouncing Around

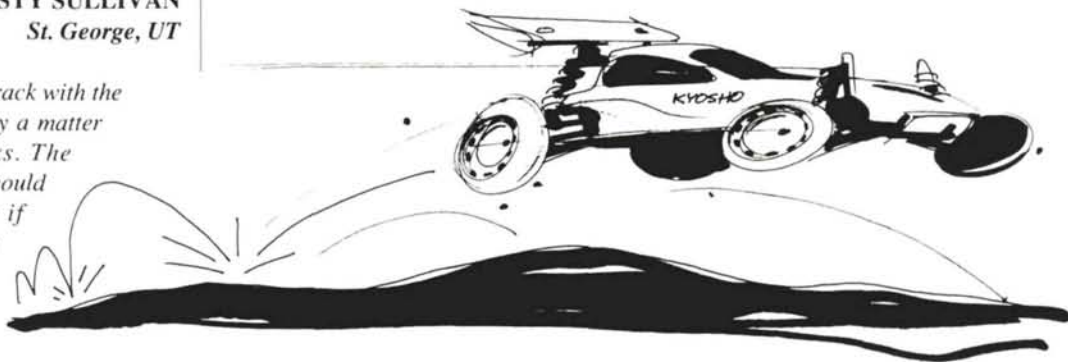
I recently purchased a Kyosho Triumph. Although it's new, the suspension has been acting a little strange. When I take it off a jump, it bounces two or three times when it lands. Is this normal? Is this the way the suspension works on all cars? Should I oil the shocks? Help!

RUSTY SULLIVAN
St. George, UT

You're on the right track with the oil, but it's not really a matter of oiling the shocks. The Triumph's shocks should be filled with oil; if they aren't, that's the cause of your trouble right there. If they have oil,

then you need to use a heavier oil. Oil is forced through the holes in the piston as it passes through the shock body. If the oil is too light, it will flow too easily, and there won't be enough resistance to absorb a landing. The result will be a bottoming of the suspension

and a rebounding. Again, less resistance means a faster rebound and, possibly, flight. Read your instructions on filling the shocks with oil, and try some 30 weight. I recommend silicone oil because it won't thicken in cold weather or thin in hot weather.



Bearing With Bearings

I own an RC10T that I run with a stock Reedy Green motor and stock dogbones. It keeps destroying both rear drive axle bearings, and it's always the inner bearings that fail. I clean them religiously after every third battery pack, and on the bearings and the motor, I use Brake Clean, which seems to do a good job of cleaning them. I run the suspension on the Associated Gold shocks using 40WT silicone oil in all four corners, while using Red springs in the rear and Blue springs up front. All are adjusted to spec (the rear is parallel to the ground, and the front is slightly higher).

I've had the same problem with bearing failure using 30WT oil in all four corners and Gold springs all around.

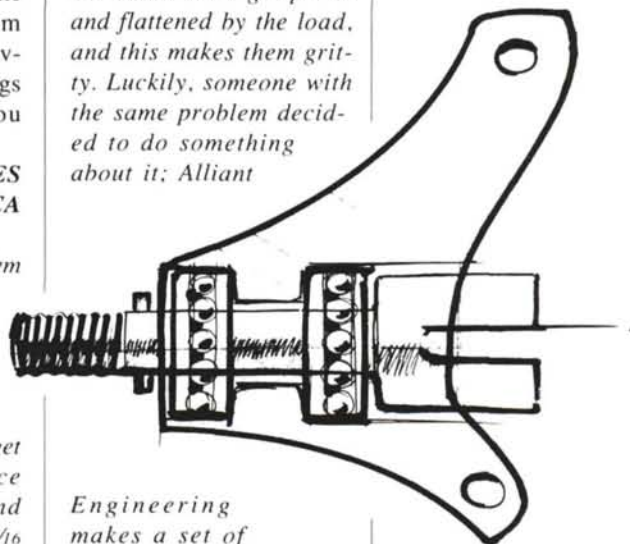
A fellow RC10T owner told me to shim the inside bearings with a cone washer, and I tried that, but I still lost the bearings. The truck is great, but I'm starting to get tired of having to replace the bearings so often. What can you suggest?

JAMES L. JONES
Grand Terrace, CA

I've had the same problem with my Team Car. The $\frac{1}{4} \times \frac{3}{8}$ -inch bearings aren't strong enough for serious loads. If you subtract $\frac{1}{4}$ inch from $\frac{3}{8}$ inch you get $\frac{1}{8}$ inch. The difference between the inner and outer diameter is only $\frac{1}{16}$ inch. So each ball is probably $\frac{1}{32}$ inch in diameter, and each race, $\frac{1}{64}$ inch

thick. I've seen ball races crack and break apart in no time, even with on-road cars. If the races don't go, the small balls get pitted and flattened by the load, and this makes them gritty. Luckily, someone with the same problem decided to do something about it; Alliant

repeated landings without detonating, and they'll end your frustration. ■



Engineering makes a set of RC10T hub carriers that use $\frac{1}{4} \times \frac{1}{2}$ -inch bearings. These can take the abuse of

READERS' RIDES

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If the Ayatollah of Radio Controlla chooses your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the third annual "Reader's Ride of the Year Contest" in the fall of 1993. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.



THE COWINATOR

It's just too funny! This wild-looking bovine RC10T belongs to James Lane of Ronkonkoma, NY. According to James, he became bored with running typical stadium truck bodies, so he added a cow head to a Dahm's Buggy body and came up with this bizarre creation. The "Moo Mobile" is equipped with a Tekin 408 Sport ESC, Panasonic P-170s and a Trinity Chris Doseck Championship Edition motor. So, tell us James, when you're on the track, do you tell everyone to "moove" out of your way?



TEAMWORK

The photo of this ultra-clean-looking Traxxas Rad 2 came from Joe Merta of Ellsworth, WI. Though Joe's Traxxas is completely stock, he still has a blast running it. Joe's father, Gerald, helped to get the Traxxas

ready for off-road sessions by building the gearbox and shocks, and when it was ready, he also installed the electronics. Joe assembled the suspension linkage and the steering, and he helped to paint the body. To control his car, Joe uses a Futaba Magnum Sport radio with an FPR112JE receiver.

KAMIKAZE CLOD

Brett Budnik, of Whippany, NJ, says that he has improved his Clod Buster even further since he sent in this picture. He has added a lift kit, a skid plate, a push bar, bumpers, an aluminum chassis brace from ESP, oil-filled shocks and JPS aluminum ladder bars. But that's not all! Brett has also installed eight lights: two under the bumper, two in the grill and four on the rollbar. Nice-looking truck, Brett!



TERRIBLE TWOS

Matt Pateman of Placentia, CA, sent the Ayatollah this photo of his on- and off-road rides. The Kyosho Lazer is equipped with a Tekin 411P ESC, a Tekin mini-receiver, a Futaba S-130 steering servo, Kyosho Equalizer shocks and A&L ball-bearing steering. The "Thrifty" on-road car is a stock Trinity Evolution 10 that has also been modified with a Tekin 411P ESC and a Tekin mini-receiver. Steering duties are handled by a Futaba S9101 servo. As Matt puts it, "These are my two screaming babies." Well, Matt, maybe you should try feeding them batteries more often.

BUDGET RACER

RETURN OF THE BUDGET RACER

by DICK BRINTON



Team Losi's Junior T truck is a perfect vehicle to re-enter the R/C racing scene with because it's inexpensive and it performs well.

Longtime "Car Action" readers may remember the "Budget Racer" series that was published from August '88 through January '90. Author Dick Brinton was forced to end the series because of ill health.

When I became editor of "Car Action", one of my goals was to get "Budget Racer" back into its pages, because letters from readers flooded in, asking for its return. I'm pleased to say that Mr. Brinton is in good health once again, and I'm proud to herald the return of this great series. FM

WHY BUDGET RACING?

The "Budget Racer" series is aimed at people who have a limited racing budget; that's most of us. We'll explore cost-cutting ideas, track tips, car setup, racing strategy, ways to build test equipment, ideas to improve your car's handling, the psychology of R/C racing and many other topics. We'll approach everything from a budget-conscious standpoint. You'll be surprised at how fast you can go without pouring a ton of money into your hobby.

This doesn't mean that we'll be racing on the cheap! In some areas (tires, for instance), only the best will do. But all too often, I've seen people get into the hobby, spend a lot of money and then drop out because they didn't get results. Reading "Budget Racer" will help you to avoid this.

BACK IN THE SADDLE

I found that getting back into R/C car racing is the same as starting from scratch. Manufacturers' advances have resulted in the development of new products and the improvement of existing ones. So come along and follow my steps back into competition.

I decided to go off-road racing

because there's a lot of participation in off-road here in Sacramento, CA, and there are two very nice indoor tracks. With the thermometer reaching the triple-digit range, indoor racing is the way to go! I also think off-road racing is easier for beginners.

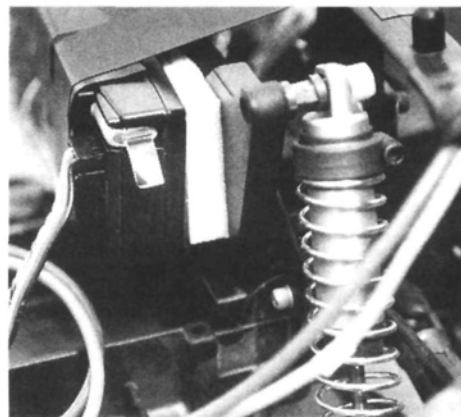
CHOOSING A BUDGET RACER

If you're just getting into R/C car racing, or you're buying a new racer, start by setting a spending limit, and then make a list of vehicles that fit your budget. Go to your local track, and see which are the most popular cars. If any of these cars are on your list, pick the one you like best. Avoid the temptation to start with a car or truck that no one else is running; in the beginning, you'll need all the help you can get.

If you can't afford a new vehicle, someone may have a good used one for sale. If you buy a used racer, have a knowledgeable friend or your local hobby shop's proprietor take a look at it before you lay out your hard-earned money. Usually, your hobby shop will know about cars for sale; they may even have some on consignment. Try to get

the instruction manual that came with the kit, and be prepared to replace the worn-out parts.

I picked a new Team Losi* Junior T truck (kit no. A 0061) for my budget



I always mount the receiver with a layer of cushioning foam to prevent it from being damaged by shock. No glitches yet!

racer. It's a high-quality, entry-level vehicle that has a list price of \$139.95, but it's usually discounted to about \$100. The construction of the Junior T is logical and well-documented, and in about a week's worth of evenings, you can have it ready for the track.

GRAEME'S JUNIOR T BUILDING COMMENTS

Because the Losi Junior T is an entry-level truck, I asked my son Graeme—who had never assembled an R/C car or truck before—to build it. Here are his comments:

• **Page 6, bag B, step 4:** if the 4-40, 1/8-inch socket-head shoulder screws bind when you tighten them, use a no. 11 X-Acto blade to chamfer the tops of the holes in part nos. 25 and 26. Be careful! Only remove enough to allow the shoulder of the screw to fit without binding.

• **Page 9, bag C:** use both the drawings and the narrative when you assemble the tranny. The parts fit together well, but they must be assembled in a particular order. If something doesn't fit, you probably haven't followed the instructions.

• **Page 9, bag C, step 1:** the 1/6 x 7/16-inch solid pin is in bag D.

That's it! Did they do a nice job on this kit, or what?

BUILDING HINTS

The first rule of proper kit building is to read the instructions completely before you tear into the kit! Resist the urge to open the bags and start sticking stuff together. For instance, in the Junior T manual, Losi talks about stress points where the truck's body might crack, and they offer advice on how to avoid this by adding reinforcement. This could influence how you prepare and paint your truck, but only if you read it before you start.

MAKING THE BUDGET BEAST

The Losi Junior T is a very good beginners' vehicle, and it can be upgraded all the way to an LX-T. For my initial tests, I ran the truck without any modifications. I even used Losi's "multi-element, self-lubricating" bushings.

Now, I'm generally no champion of using bushings for racing, but these Losi special bushings surprised me. When they're kept clean, they work very well. If you're on a tight budget, delay buying bearings, and use your dollars to purchase the correct tires for your track.

I tried Novak's* sport model, high-frequency,

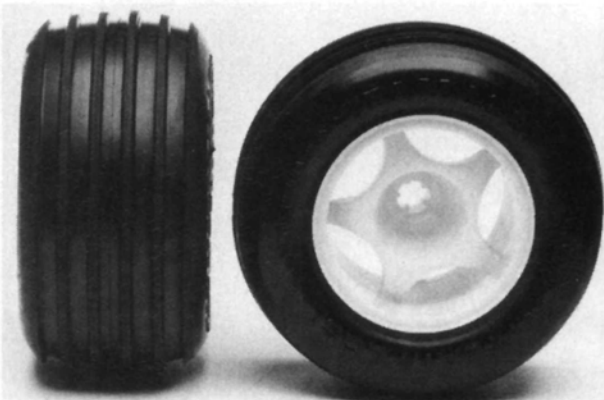
Megafet 410 M5 speed controller. It incorporates some innovations from the last two years. It uses 2500Hz motor current pulses, and it recharges the car's battery when your car coasts and brakes. I've used a Novak T4 for a long time, but the 410 M5 is much smoother, and it increases run times by about 20 percent. If you can afford to step up a bit, the Novak 410 M1c has a torque control that lets you dial in the appropriate amount of power for your driving skills and the track. I think this is one handy feature that will help you win races.

I use my trusty Futaba* Magnum Jr. AM radio, and it works faultlessly. To avoid damage from shock, I always "soft mount" the receiver, i.e., I attach it to the car with a layer of cushioning foam. Does this work? There were eight trucks running in the Main, some with FM, some with AM and maybe a PCM thrown in. The Futaba never even glitched! Try soft mounting your receiver; it makes a difference.

The Losi Junior T weighed exactly 4 pounds (including the battery pack) on the post-office scale. I read and re-read the tuning instructions in the manual, set the suspension with the toe-and-camber gauge in the kit and headed for the track. I'd like to tell you it won right out of the box, but

that's not exactly what happened.

I qualified sixth out of eight in my class. I wasn't too happy with that, but after a two-year layoff and with a brand-new truck, I told myself it was OK. The major problem was tires. I didn't have the correct rears for the track conditions until a fellow racer—Gary—handed me a mounted pair



If you're on a tight budget, don't buy ball bearings; spend your money on the right tires for your track. Add the bearings after you're up to speed.

and said, "Try these." They worked very well, and I was running in second place in the Main when the left rear camber rod popped off in a freak accident. (Aren't they all freak accidents?) After I had finally made the repairs, I ended up last across the finish line. Oh, misery and pain!

I learned a lot in my first race:

- Running bushings, the Losi Junior T can hold its own with more expensive race trucks—at least, in the stock-motor class on a tight track.
- The right tires are an absolute requirement.

• Losi's setup instructions will produce a truck that handles well. If the handling gets out of whack while you're experimenting, you can always read the manual and go back to the basic, workable setup.

In the next "Budget Racer," we'll start upgrading, experimenting and doing some racing—I hope with more success.

See you at the track.

Easy Construction Tips

Here are some ideas that can save you time and frustration when you build a kit:

- Using a ball driver will speed up building, but be careful of the increased torque of the ball driver or you'll strip threads.
- If you strip threads in plastic parts, fill the hole with Pacer's* Zap Lock, insert the screw, let it sit about 10 minutes, and remove it. Let the Zap Lock harden and presto!—a threaded hole.
- When you have a piece that must be fastened to another piece with a series of screws, start all the screws at least halfway before you tighten any of them.
- If any plastic parts that must be screwed to other parts will be difficult to reach after they've been installed, pre-thread the holes before you install the parts. As a matter of fact, I pre-thread the holes in most parts before I start the final assembly.



Pacer's Zap Lock works well for repairing stripped threads in plastic.

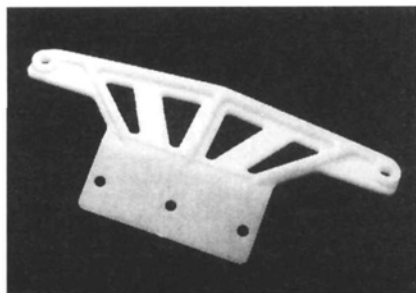
**Here are the addresses of the companies mentioned in this article:*

Team Losi, 13848 Magnolia Ave., Chino, CA 91710; (909) 465-9400.
Novak Electronics Inc., 18910 Teller Ave., Irvine, CA 92715; (714) 549-0857.
Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718; (714) 455-9888.
Pacer Technology and Research, 9420 Santa Anita Ave., Rancho Cucamonga, CA 91730; (714) 987-0550. ■

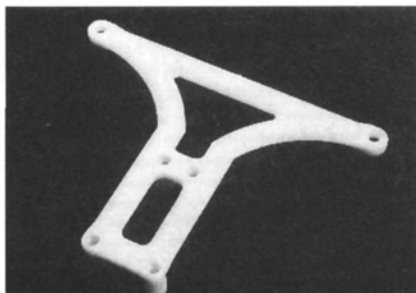


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TEAM LOSI

TECH TALK

SMOOTH OPERATORS

It seems to me that as competition gets fiercer, everyone looks for that "little extra." It might be a new trick part or just a simple little thing that you do to your car that the other guys don't do. Well, I'm going to pass on a little "trick" that most of the factory racers have been using for quite some time now. By following this procedure, you should wind up with some of the smoothest shocks around.

The O-rings in the shock cartridges keep the oil in the shocks by wiping the oil off the shock shaft as it passes through the cartridge. The only problem with this is that the O-rings have a lot of drag, or what we like to call "stiction." This can be virtually eliminated by using a good Teflon grease to lubricate the O-rings. The best grease that I have found for this is the RCPS "Green Slime Grease" (part no. 060).

When you assemble cartridges with this grease, use new cartridges to ensure that the O-rings haven't been scratched or damaged. If the cartridge is assembled, disassemble it by carefully prying off the cap. Be careful not to damage the cap; it will have to be snapped back in place when you're finished. Coat one O-ring all the way around with the grease, and place it back into the cartridge, being careful not to pinch or tear the O-ring. Next, place some grease in the i.d. of the plastic spacer and insert it into the cartridge. Coat the second O-ring and place it on top of the spacer. Be sure that all the parts are completely seated into the cartridge and snap the cartridge cap in place. Carefully slide the new cartridge over the grooved end of the shock shaft and wipe any excess oil from the shaft. Now fill your shock with oil and reassemble it. The grease not only makes the shocks smoother, but it also stops oil from "seeping" out of the shocks, and it helps to keep dirt out of the shocks.

EVEN SMOOTHER YET!

You can make your shocks even smoother yet by using Team Losi's new Titanium Nitride shock shafts. They're available in all three Team Losi shock lengths. These shafts, along with the above-mentioned tip, will give you the smoothest shocks possible!

* * *

Let us know what's going on! Address your questions and problems to Team Losi, "Tech Talk," 13848 Magnolia Ave., Dept. J, Chino, CA 91710.

New BAT-SINK

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Battery Heat Sink wraps around individual cells and really keeps 'em cool.



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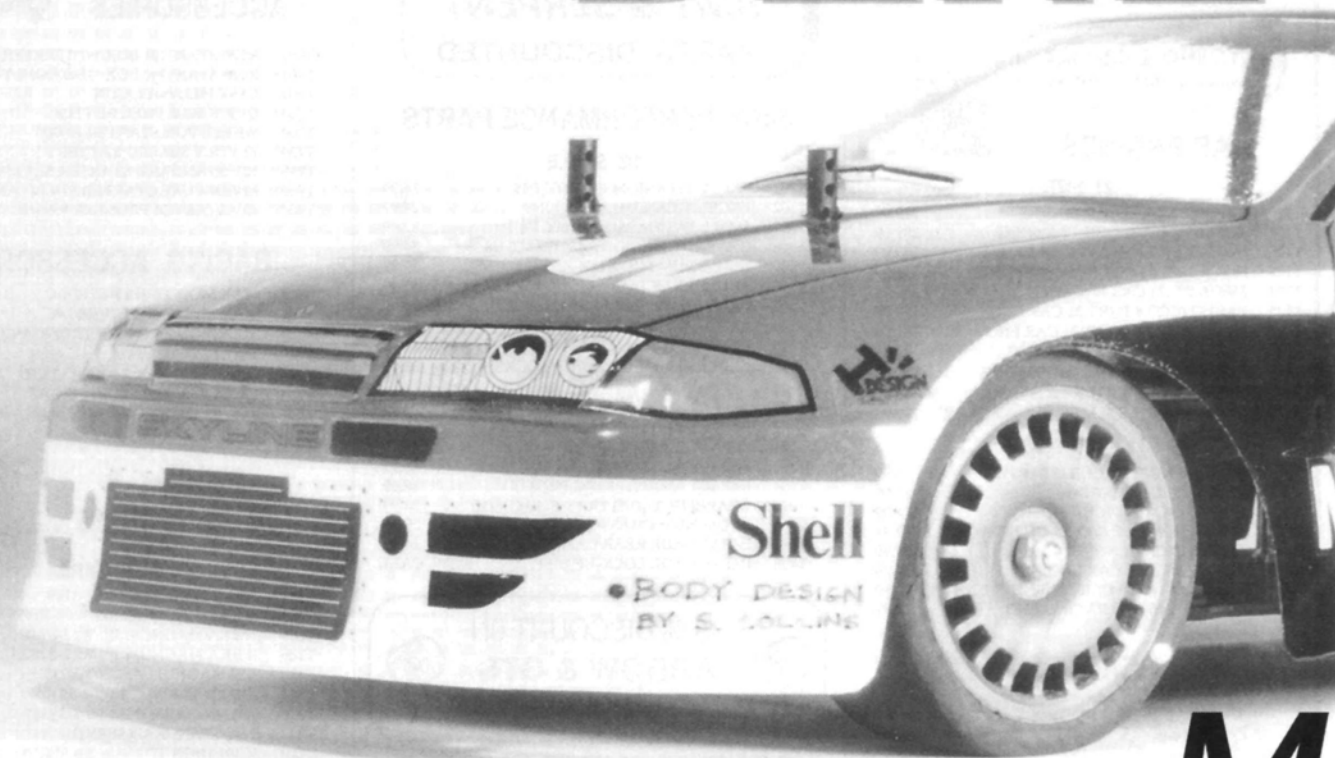
PROJECT

THERE'S SOMETHING ABOUT Mercedes-Benz that says quality, cutting-edge technology and racing heritage. These are the same features you'll find in Tamiya's* line of R/C products. Well, the two came together, and the result was Tamiya's 1/10-scale 4WD Mercedes-Benz 190E—a "Wondertwin powers activate" kind of thing. In stock form, it performs well, but enthusiasts will demand better.

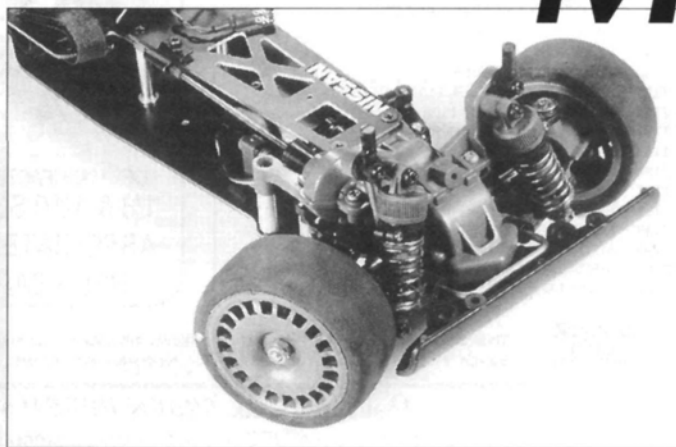
Tamiya

by STEVE COLLINS

BENZ



To keep things cool, add a driver's-side air scoop to the side of the body.



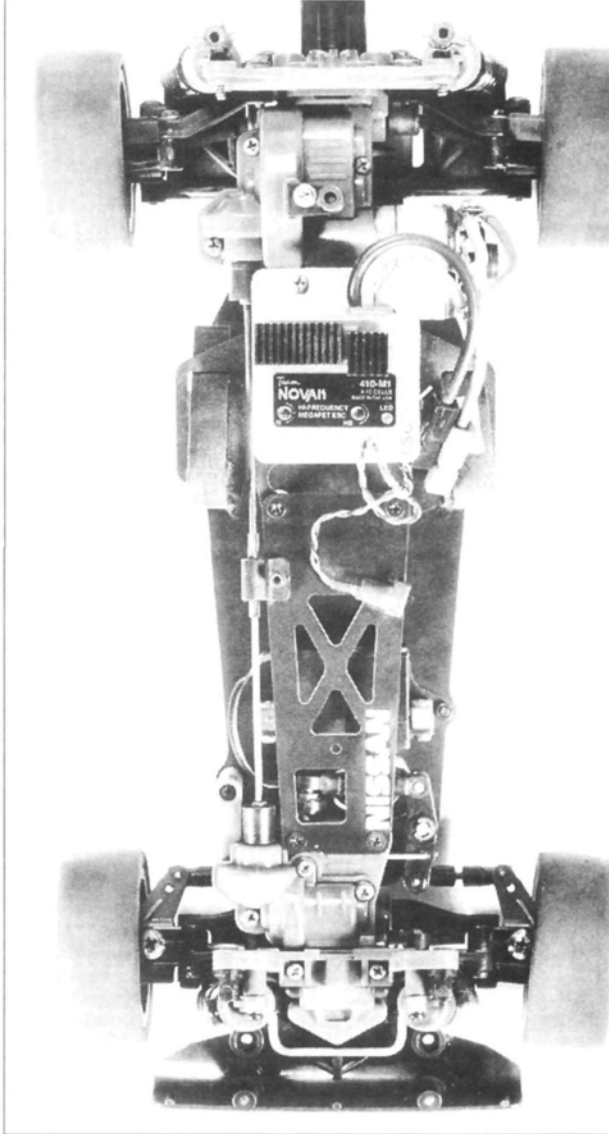
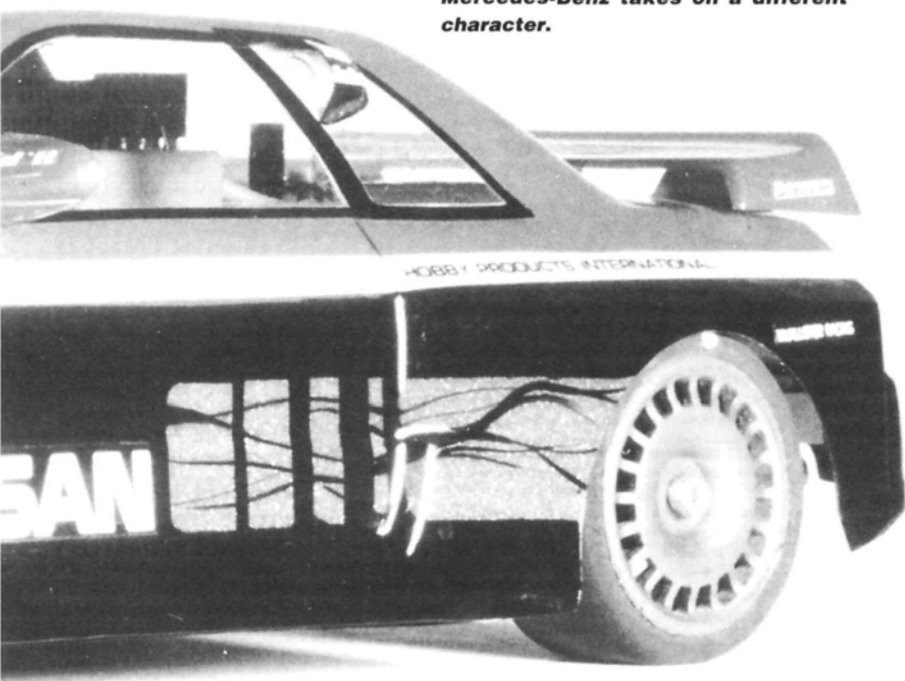
The Benz comes with a metal gear diff up front that makes the car understeer. Adding a one-way diff solved the problem.

Project Benz enhances the strong points of the car's design. I've removed or modified the weak points to decrease weight and clutter. This project isn't about spending tons of money on a car to impress others, but it *is* about showing what can be done to a good design and about turning a sports sedan into a road rocket! Owners of other Tamiya cars that use the same chassis layout—such as the Manta Ray, the Celica GT-Four Rally and the new Escort RS—could also benefit from this article.

CHASSIS SWITCH

Many on-road vehicles have simple, light chassis. The stock Benz chassis is a problem, though. Don't get me wrong; it's a beautiful piece of injection-molded

With the addition of new "sheet metal" (a light Nissan Skyline GT-R body from HPI), Tamiya's 4WD Mercedes-Benz takes on a different character.



The stock Benz chassis tends to be heavy, so it was replaced with a light, fiberglass chassis from HPI.

Mercedes Makeover

art, but it doesn't fit in with the improvement theme. It tends to be heavy, and it doesn't have room for an extra battery cell. The small hexagonal ribs that have been molded into the floor provide strength, but they also hold road grunge and moisture, so they're hard to clean. Tamiya cars are always well-engineered, but sometimes they're "over-engineered." A serious racing machine should have a simple setup.

HPI* has the answer: a chassis conversion set for Tamiya 4WD sedans. It consists of three main, black, fiberglass plates and a variety of fiberglass spacers. The holes are countersunk, and a complete set of screws and aluminum support posts is included. The instructions for assembly are clear; the type, however, is a little small.

After I had taken my Benz apart and cleaned its components, I

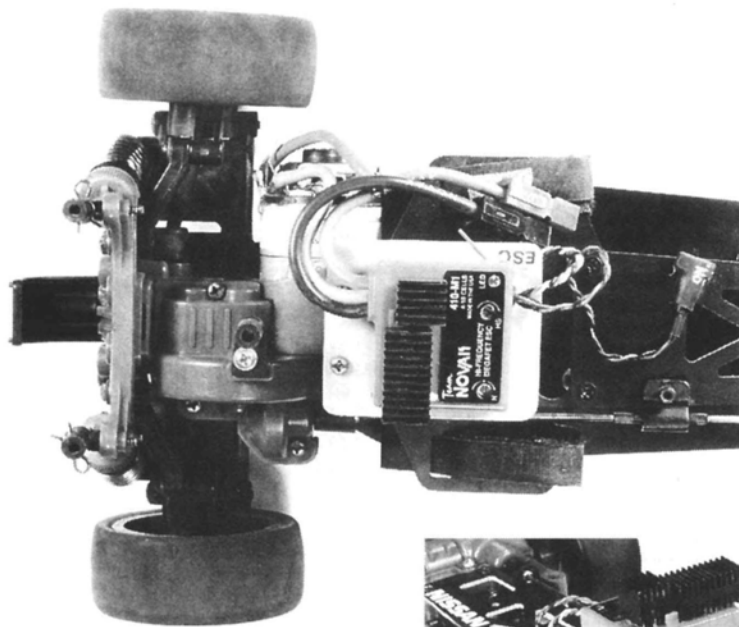
used a Dremel* tool to separate some of the HPI chassis parts. (Four come on a tree.) If you don't own a Dremel tool, use a sharp pair of side cutters to cut the pieces apart, and file away the excess material. Whatever you do, be careful! I've heard some gruesome stories

about careless Dremel users! After you've put it together, you'll have a lighter, stronger, cooler-looking, uncluttered chassis.

DIFF DECISION

It has been said that a 4WD is easier to drive than a 2WD. But easier isn't always better for the speed seeker. A 4WD car with gear diffs usually exhibits terrible understeer (good for beginners) and scrambles for a straight shot off the line. The Benz has a ball diff in the rear, but a metal gear diff up front. Replacing the gear diff with a one-way diff would improve cornering and make the car more fun to drive.

HPI offers a one-way diff for a reasonable price, and if you want to make the biggest single improvement to your Benz,



simple graphics and detail. The "little" things—rivets, door lines, decals, etc.—can really make the car.

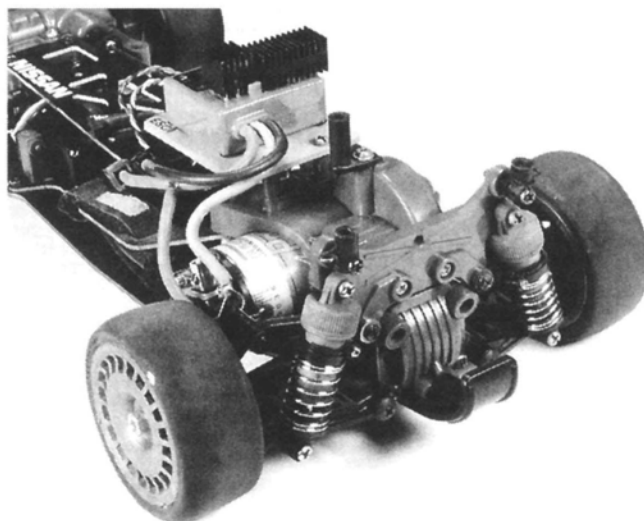
In the Tamiya lineup, the stock body is another champion of detail, but even with all the racy detail, the Mercedes body still looks too civilized. HPI to the rescue again! Yes, friends, the skyline GTR wide body is the coolest body for this car. And it's so wide that HPI

Left: to prevent the prop shaft from flexing, make an aluminum prop-shaft guide.

Below: although they're made of plastic, the Tamiya shocks perform consistently, especially when they're filled with silicone oil.

includes wheel-adaptor extenders to compensate for the extra space. Also included in the "body bag" are decals, a wing and some Lexan mirrors that are very challenging to cut out. I went to work painting the body, and a couple of days later, my mean-looking Nissan was ready for battle. To help cool the internals, I added a driver's side scoop/snorkel. Boy, it looks mean!

Skyline, Celica, Escort, etc., then this is the one. It provides the same power to both front wheels *and* increases steering response—maybe enough to swing the tail out and get all crossed up in a violent power slide! (OK, I'm calm now.) By the way, the one-way diff comes already assembled by HPI. The instructions for its installation are in Japanese, but as long as it locks "posi" when you rotate it forward in the gear-box, you're all set. Some special graphite-silicone grease is included, and there's enough to lubricate about 50 diffs. Cool!



LIVE WIRE

I installed a variety of goods in the chassis. The steering linkage is smooth and short, so I chose a Futaba* S148 servo to handle the front end. I also added a Novak* 410-M1 electronic speed controller and a Kyosho* receiver. These components fit nicely, and with the

proper type and number of capacitors installed on the DuraTrax* 12-turn motor, the setup was glitch-free.

PUNCH IT!

My trigger finger was itchin' to go to work on this car. I was really stoked about the one-way diff. I installed a fresh pack, turned the car on and blasted away! Man, this car rips! My expectations were right about swinging the tail out. The car handled tightly and "on rails" under power, but with minimal braking, it was a wild, sliding ride. Three words: it really horked! (Hork: to book; to boogie; to churn; to punch it.) I've never had so much fun with a 4WD car, and I never thought that making such simple changes could make it possible. On-road is cool!

DRIVELINE MODS

The prop shaft and dogbones needed beefing up, and the improvements I made really helped. I made a guide out of aluminum to contain the prop shaft. Preventing this shaft from flexing is important. The dogbones will last a long time, but if you put a lot of miles on your Benz and you use a hot wind, they tend to wear at warp speed. (Check out the track report on the Benz in the July '93 issue of *R/C Car Action*.) Of course, bearings are a must, and there are a lot of them. Without them, you'll lose speed, durability and run time. Use them, or be punished!

SUSPENSION CORRECTION

I'm impressed with the Benz's shocks, even though they're plastic. They're consistent in their damping—especially if you fill them with silicone oil. Hard-anodized mini-shocks would be nice, but they're not absolutely necessary.

My theory for on-road racing is: lower is better! To lower your car as much as possible, put the V6 and V7 spacers (included in the Tamiya kit) over each shock shaft before you place the shafts in the shock bodies. Lowering the car will also make the dogbones last longer.

BODACIOUS BOD

Contrary to the opinion of my fellow racers/car abusers, body painting can be fun. My best paint jobs are the result of using

**Here are the addresses of the companies mentioned in this article:*

Tamiya America Inc., 2 Orion, Aliso Viejo, CA 92656; (714) 362-2240.

HPI, 22600-C Lambert St., Ste. 904, El Toro, CA 92630; (714) 837-3250.

Dremel, 4915 21st St., Racine, WI 53406.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718; (714) 455-9888.

Novak Electronics Inc., 18910 Teller Ave., Irvine, CA 92715; (714) 549-0857.

Kyosho/Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826; (217) 398-3630.

DuraTrax/Great Planes Model Distributors. ■



BOLINK

LTO *pro*

by JIM SHEPKA

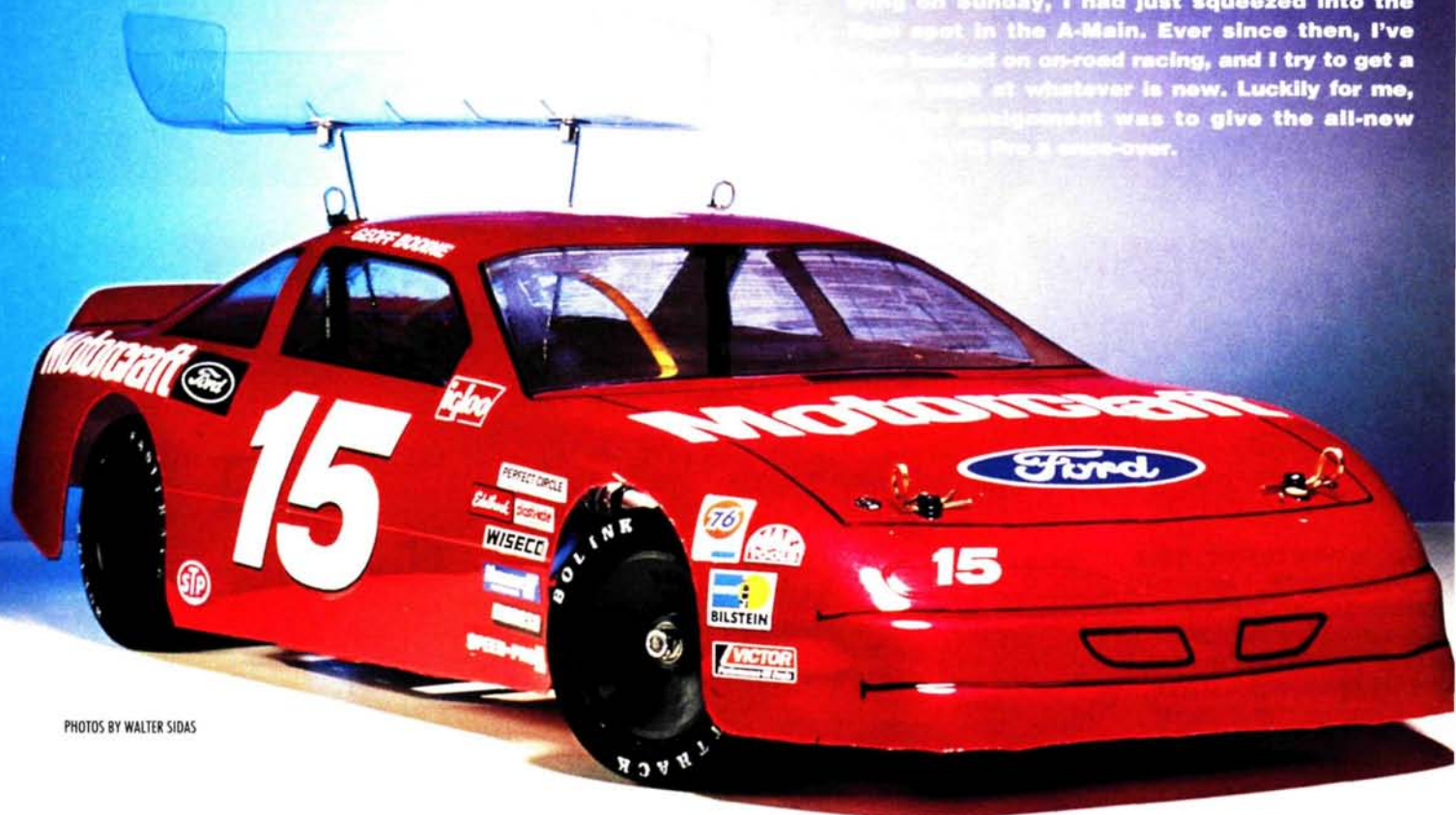
I CAN VIVIDLY remember my very first pan car. My kid brother invited me to a race that was being held with an auto show in Pennsylvania. There were two classes—transmission and straight-axle. Running in the transmission class was no problem; I just put some foam sneakers on my off-road ride, and I was ready to head south. But then I started to think that if I was driving all that way—I live in Massachusetts—I should compete in both classes. So, on the way to the highway, I stopped at my local hobby shop and bought a pan car (call me impulsive). And, let me tell you, I'm not too proud to admit that I knew absolutely nothing about on-road racing.

Six hours later, somewhere on the Pennsaltucky Highway, with my wife at the wheel, I had—for better or for worse—built my

first oval car (minus a few screws that I never managed to find under the back seat). We arrived quite late for practice, and I managed to get in only a couple of laps with my Ultima before the track closed.

The first round of qualifying was held on Saturday morning. With no practice and very little confidence, I took a guess at my setup for the pan

car, and I managed not to embarrass myself or break anything during the first heat. As the weekend progressed, my confidence with the equipment grew, and by the final round of qualifying on Sunday, I had just squeezed into the last spot in the A-Main. Ever since then, I've been hooked on on-road racing, and I try to get a good look at whatever is new. Luckily for me, my assignment was to give the all-new LTO Pro a once-over.



PHOTOS BY WALTER SIDAS

OVAL ODDSMAKER

CONSTRUCTION

Because I received one of the first prototype cars, it came to me built. I won't bore you with the details of building techniques; you'll just have to assume that we all know what we're doing. I will, however, point out some of the latest go-fast tricks that come with the car.

"New from the ground up" is probably the best way to describe the LTO Pro. Besides the differential and a few front-suspension components, the car is totally new. Bolink's latest superspeedway ride was built with one goal in mind—winning! Because it was so new, they hadn't had time to print an instruction manual. A quick phone call to Rick Jordan at Bolink was all it took to get the lowdown.

The first difference is in the rear pod and the suspension geometry. In lieu of the typical Bolink T-plate, Bolink has used the latest suspension design. Attached to the inside of both motor mounts is a graphite bar that rotates on bearings at each end. The graphite travel bar is secured to the "T" section of a standard configured T-plate with two brackets. This allows the motor pod to move freely.

Damping is controlled by a Delta shock that's secured to the top of the upper motor-mount brace and to a shock-mounting post at the front of the T-plate. The tweak screws have been replaced with side-roll-damping shock bodies that are attached to the center of the upper motor-mount brace. These two shocks extend



sis stiffeners (braces). They run lengthwise, and their weight is certainly minimal, especially when you consider their benefits.

The front suspension is a change for Bolink; it's now a two-piece design rather than the one-piece cross-member that has been Bolink's trademark for years. Caster and camber are easier to adjust, and you get the benefit of longer kingpins, which greatly increase suspension travel. The sus-

pension also comes with color-coded front springs that you can change quickly—just pop off an E-clip and remove the upper-kingpin support bracket. Bolink's standard Pro diff, with a graphite axle, aluminum hubs and a full complement of bearings, rounds out the package.

TESTING

I made the first shakedown runs at my local carpet track. I've tested a variety of cars at this facility, so I have a good idea of what it takes to get around at a decent clip. First, I changed the tires to a compound that would work well on the carpet. I used an orange/blue dot on the right front, a blue dot on the left front and green dots in the rear, and I used a relatively mild, 14-turn-double Trinity* Championship Series modified Buzz Saw motor with low

BOLINK LTO PRO

Scale 1/10
Price \$349.95

DIMENSIONS:

Overall length 13.5 in.
Width 7.75 in.
Wheelbase 10.5 in.
Front track 7.6 in.
Rear track 7.75 in.

WEIGHT:

Gross (with battery) 2 lb., 10.8 oz.

CHASSIS:

Type Plate
Material Graphite

DRIVE TRAIN:

Type Direct-drive
Primary Pinion/spur
Differential Ball
Bearings/bushings 1/4x3/8 flanged bearings

SUSPENSION:

Front: Type Independent
adjustable camber/caster
Damping Silicone

Rear: Type Ball-bearing pivot with
three-way damping
Damping Oil-filled shock/
spring-loaded, silicone dampers

WHEELS:

Front: Type Bolink Excel
Dimensions (DxW) 1.8x1.2 in.
Rear: Type Bolink Excel
Dimensions (DxW) 1.8x2 in.

TIRES:

Front/Rear Bolink green-dot

ELECTRICS:

Motor, battery, speed controller
Not included

Options Tested: Futaba* S-132 servo and PCM 1024 FM receiver; Tekin* TSC 411G ESC; Trinity Championship Series Modified motor and 1400 SCR Team Cells; Bud's* antenna; Tekin Holedshot switch mount; Robinson Racing* spur gear.



The kit comes with Bolink's green-dot foam tires, but for more extensive oval testing, I switched to a set of Bolink BSR cap tires.

outward on each side of the T-plate and are secured to a body-mount cross-member brace that's elevated by nylon stand-offs. Because the shock bodies are adjustable, you can quickly change tweak and side roll to suit your liking.

With such a reactive rear suspension, it's very important that the chassis is rigid, so that the suspension can do its thing and keep the tires in touch with the pavement. Therefore, Bolink added chas-

HITS

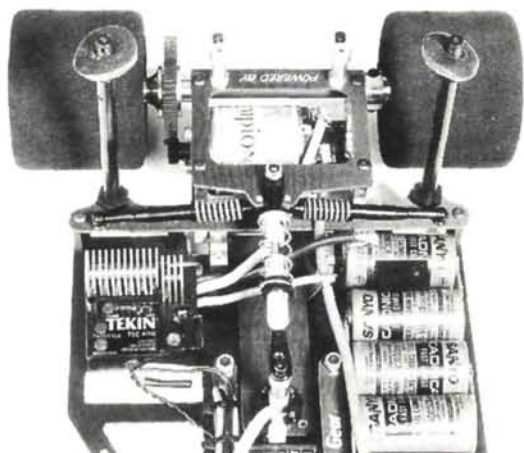
- High-quality construction.
- High degree of adjustability.
- Competitively priced.

MISSES

- Not for novice racers.
- Dialing-in the car takes some effort.



LTO PRO



Bolink's all-new rear suspension provides damping for the full range of its motion. A single Delta shock handles up and down movement, while two damping shock bodies handle side roll.

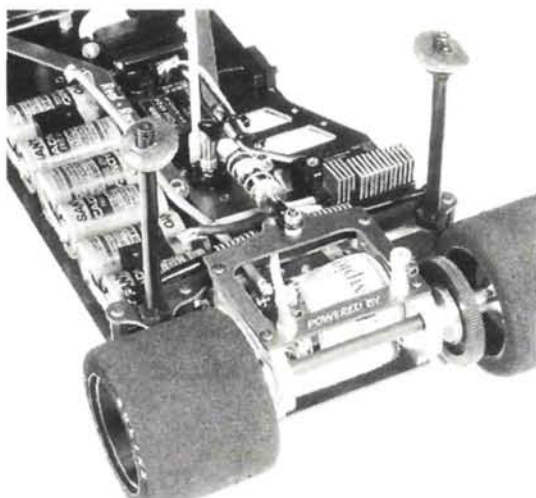
gearing—just so I could shake out the bugs.

After a couple of quick laps to check steering response and "driveability," I pulled it in for one last look. If first impressions mean anything—and they do to me—this thing has serious potential. Not only was it rock-steady down the straights, but it also had very aggressive turn-in capabilities; it held a tight line.

It bogged down a little coming off tight turns, but I quickly corrected this problem by adjusting the right front spring. I popped off the E-clip and dropped in a stiffer spring. As always, remember to make only one adjustment at a time. It's the only way to understand the impact that your changes have.

The new braced front end has longer kingpins, and this allows a much broader range of suspension travel. You can set tweak and side roll simply by turning the shock bodies in or out. So many suspension settings are possible that, at first, choosing the correct one can be tough. I highly recommend that you start with a basic setup (equal weight bias on all corners) and keep detailed notes of any changes that you make. One of the really neat aspects of having a highly adjustable suspension is that you can dial it in for maximum performance. But, as we all know too well, when you're off, you're left in the dust!

Although the Bolink LTO Pro was up to running the "Bull Ring," it was really designed for the superspeedway scene. The first real test came at the hands of the "Megamonster"—Megatrak, in Browns Mill, NJ! Although Megatrak is known for its high banks and awesome speeds, it's one of the bumpiest tracks on the circuit, so setup and handling are key. I switched to cap tires, but I didn't make many other changes for the first test session. I



A Tekin 411G ESC, Trinity 1400 SCR Team Cells, and a Trinity Championship Series modified motor power the LTO Pro. A Robinson Racing spur gear complements the package.

went with Bolink's BSR Caps with just a slight bit of stagger, a 13-turn-double modified motor and fresh Trinity Panasonic P-170s.

Again, I took a couple of hot laps, and I found that the car was just a little too loose for my driving style (a.k.a. Holy #@!*). I pulled it in and quickly changed to stiffer springs up front, and this was more to my liking. It really tightened up in the corners, and this allowed a smooth transition from

NOT ONLY WAS IT ROCK-STEADY DOWN THE STRAIGHTS, BUT IT ALSO HAD VERY AGGRESSIVE TURN-IN CAPABILITIES; IT HELD A TIGHT LINE.



The Bolink LTO Pro comes with an all-new, two-piece front-suspension system that replaces the typical, one-piece cross-member that Bolink had previously used.

the high banks to the straight. I thought that I was carrying much more speed than before, and the stopwatch proved it; there was a big improvement in lap times.

A lot can be said for the new suspension design. It handled the rough sections well and kept the tires planted on the track. It's also quite easy to set up and work with, so you can get up to speed very quickly.

SUMMARY

As oval cars become more and more sophisticated, ever-increasing attention is paid to even the smallest details. Time will tell whether the new Bolink LTO Pro will make your life easier on the track, but one thing is certain: the good ol' boys from Georgia sure do make it a lot easier to get there from here. Oh, and by the way, my first car...it was a Bolink Eliminator!

**Here are the addresses of the companies mentioned in this article:*

Bolink R/C Cars Inc., 420 Hosea Rd., Lawrenceville, GA 30245; (404) 963-0252.

Trinity Products Inc., 1901 E. Linden Ave., #8, Linden, NJ 07036; (908) 862-1705.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718; (714) 455-9888.

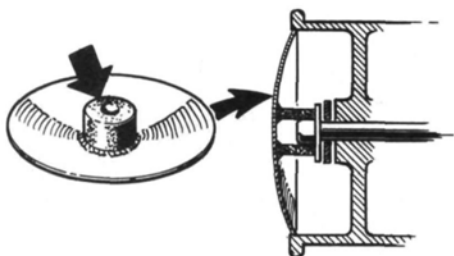
Tekin Electronics, 940 Calle Negocio, #140, San Clemente, CA 92673; (714) 366-9016.

Bud's Racing Products, 1575 Lowell St., Elyria, OH 44035; (216) 284-0271.

Robinson Racing Products, 4968 Meadowview Ln., Mariposa, CA 95338; (209) 966-2465.

PIT TIPS

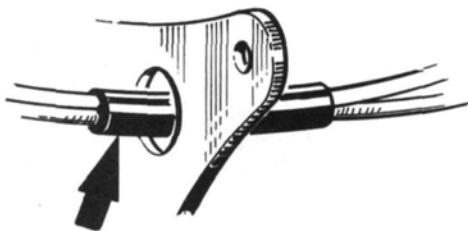
by JIM NEWMAN



HUBCAPS

You can make hubcaps by cutting the domed bottom off a soft-drink can with a pair of scissors, hot-gluing a short piece of car vacuum hose to the inside center of the dome and then plugging the hose and cap onto the wheel-retaining nut.

Mike Zmudzinski, Lansing, IL



WIRE PROTECTION

To protect wire insulation from being cut by the sharp edges of chassis holes, put pieces of shrink-sleeve around the outside of the wires where they pass through the holes.

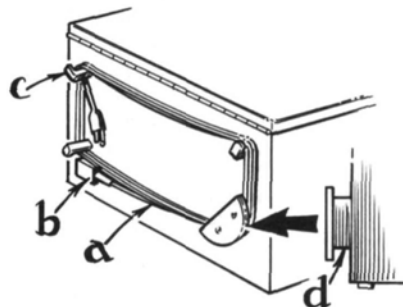
Hilary Gierman, Columbus, NJ



BRIGHT PINION I.D.

It's sometimes difficult to read the small numbers stamped on pinion gears. To make them easy to identify, paint on colored dots according to the resistor code: black = 0; brown = 1; red = 2; orange = 3; yellow = 4; green = 5; blue = 6; violet = 7; gray = 8; white = 9. For example, a 13-tooth pinion would have a brown dot and an orange dot.

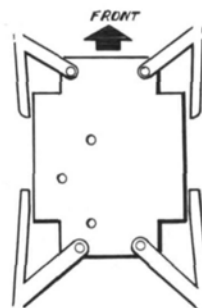
Phil McCary III, Moreno Valley, CA



PIT-KIT EXTENSION CORD

Screw four plastic brackets (c) to the rear of your pit-kit toolbox. If you can't find suitable brackets, you can make them out of wood as shown at (d). Wind the extension cord (a) around the brackets, ending at an outlet (b) that's screwed to the back of the box and is accessible from the inside.

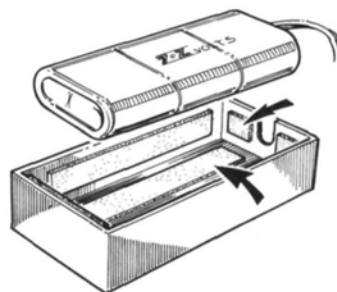
Merlo Sergio, Milan, Italy



CLOD-BUSTER SERVO-SCREW ACCESS

To avoid having to remove the chassis brace to access the steering servo screws, drill three holes in the plate, as shown. The holes are directly in line with the screws—easy access!

Nicholas Shone, APO AE

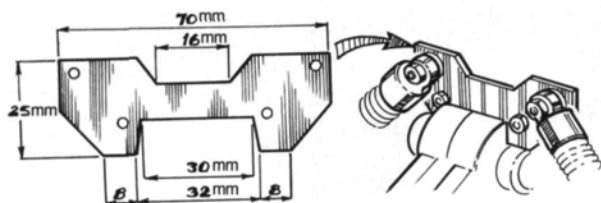


BATTERY-PACK CUSHIONS

If you have enough room, protect your battery packs from shock and vibration by lining the inside of your battery box with self-adhesive foam strips.

Onur Bolel, Istanbul, Turkey

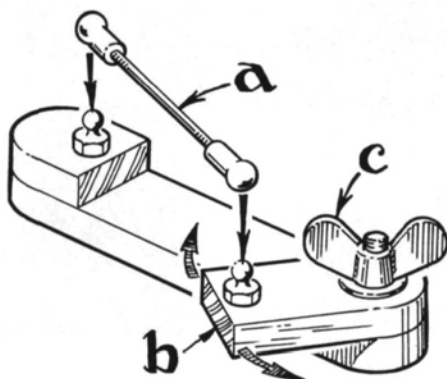
PLEASE NOTE: be sure to print your name and full address clearly on every letter and sketch you send to "Pit Tips." We can't publish many good tips because we don't have the senders' names or addresses.



KYOSHO RS200 SHOCK-MOUNT REPAIR

If your RS200's shock-mounting holes wear so much that you can no longer tighten its shocks, try this: make an adapter plate out of 1/16-inch (2mm) aluminum and mount it on the gearbox screws to fix the problem. All the dimensions shown are in metric and should be read straight from a metric ruler.

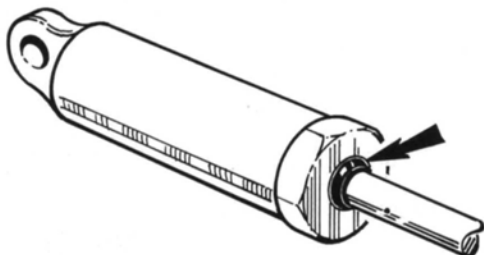
Cheah Sin Poh, Singapore, Malaysia



LINK-MATCHING JIG

If you want to make two tie rods of identical length, make this jig out of wood, and glue in two ball links, as shown. To match the tie rods, place the rod (a), which has been adjusted to fit the car, on the balls, rotating the arm (b) to allow this. With the link in place, lock the arm with a thumbscrew (c). Remove the link and make the second link to fit on the balls. Now you'll have two identical links to place on the car.

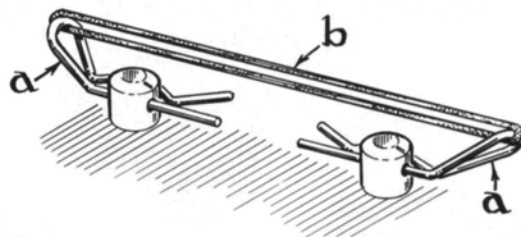
Ron Keller, Renton, WA



LOSI JRX-PRO DIRT SEAL

When you replace the shock cartridges on your Losi JRX-Pro, install the old seal on the outside, securing it to the housing with a little glue. This old seal will scrape off dirt before it gets inside the shock and tears up the new seals.

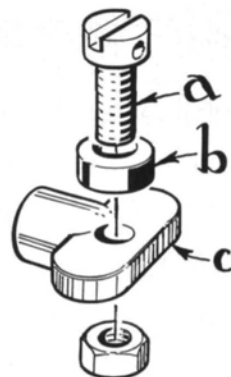
Dave Beesley, Stourbridge, W. Midlands, England



BODY-CLIP RETAINER

Bend the ends of the body clips upward at a 45-degree angle (a); then run a rubber band from one clip to the other. This will prevent them from being knocked out and lost in a crash. Secure each clip to the car with nylon cord, too.

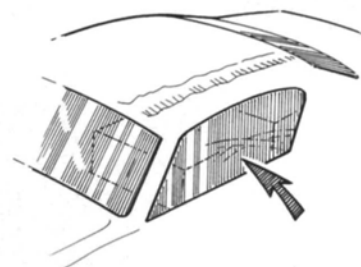
Fernando Muramatsu, Lima, Peru



RC10T REPLACEMENT MOUNTS

If the rear body mounts come off your RC10T, you can replace them with battery-box screws (a) that have been cross-drilled and will accept the body clips. You'll need washers or a spacer (b) under the screw head and a nut under the bracket (c) to hold the setup together. (This tip may apply to other cars, as well.)

Ali Khani, Torrance, CA



OPAQUE WINDOWS

If you'd like to hide the wires inside your car from view, lightly sand the windows with very fine sandpaper. Worn-out 600-grit sandpaper works fine; just stroke in one direction. Of course, you could also stick a little of the dark film used on automobile windows on the inside of your car's windows.

Miguel Angel Caracuel Roldan, Cordoba, Spain

Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 251 Danbury Rd. Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.



by JOHN HUBER



OK, I KNOW what the Pirate is, but what's the "RS" for?—Rally Special? I don't think so. Really Steep? No, the price is good. I don't know *what* it stands for, but I intend to find out!

DRIVELINE

The first thing in this kit that caught my eye was the beefed-up drive train. The nylon diff cases in the original M-1 Pirate couldn't handle the power of the hot modified motors, and they warped after a while. The Pirate* RS kit includes three billet aluminum cases. They're sealed with O-rings at the center and the outdrives so they can be packed with grease. Steel bushings are inserted in the case where the drive shafts exit to prevent wear. The center diff has a machined performance diff gear. Bolted to the front and rear diffs is a set of steel ring gears. It's a complete racing drive system all in one box! You might want to add a one-way center diff, but I'm going to see how it works with a gear diff for now. I loaded it up with Kyosho* 50,000 silicone oil—very thick!

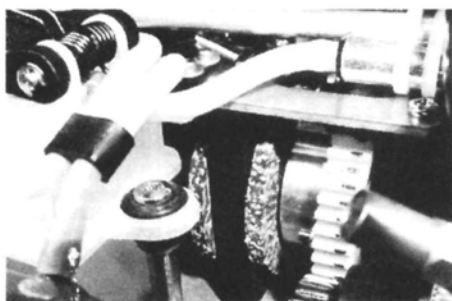
So, it has a great driveline, but how about the suspension?

**High-
Seas
Hauler**

Pirate RS

SHOCKS

To me, the number-one sign of a good suspension is a set of high-quality shocks. And no matter how cool they look, they must be hard-anodized to last. If they're bare aluminum, they'll wear immediately and foul the oil inside. If they're gold-, blue-, or purple-anodized, they'll be OK for a while, but they'll soon wear just as non-anodized ones do. Hard-anodizing strengthens the metal and makes it much



Twin disk brakes stop the RS with incredible authority. You can see the new chassis brace above the center diff.



The Pirata RS kit includes all the race-winning hardware you need. Just add the radio and engine of your choice, and it will be ready to burn up the track! (Optional tri-level wing shown here.)

more resistant to wear caused by the moving piston. The RS has large-volume, hard-anodized shocks with threaded bodies so you can adjust spring tension.

STIFF ARMS

On the original Pirata, the lower suspension arms were a serious problem. After a lot of

use, they began to warp and sag. I was happy to find arms made of a much stiffer material in this kit. The rear arms are also a little wider and include a new anti-sway bar.

DA BRAKES

To stop the car quickly, a dual-brake system with high-quality brake disks is included. One rod actuates both the front and rear

PIRATE RS

Manufacturer Imported by OFNA;
distributed by Horizon
Type 4WD gas off-road
Scale 1/8
Price \$679.95

DIMENSIONS:

Overall length 17.5 in.
Width 12 in.
Wheelbase 12.75 in.
Front track 10 in.
Rear track 10.25 in.

WEIGHT:

Gross (without fuel) 7 lb., 10.7 oz.

BODY:

Type Single-seat buggy
Material Lexan

CHASSIS:

Type Plate
Material Hard-anodized aluminum

DRIVE TRAIN:

Primary Gear
Transmission Steel helical gear
Differential(s) Three planetary diffs
Bearings/bushings Ball bearings

SUSPENSION:

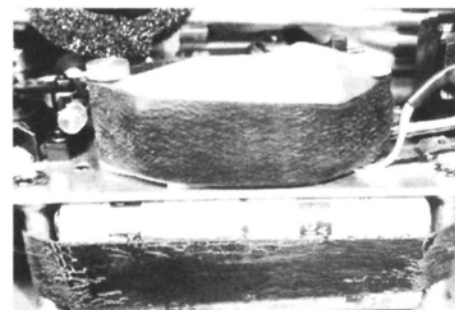
Type (f/r) Upper/lower A-arm
Damping Oil-filled coil-overs

WHEELS:

Type (f/r) Three-spoke nylon
Dimensions (DxW) 80x40mm
Tires (f/r) Medium X-pattern

ENGINE/PIPE:

Engine type 21 (not included)
Manifold O.S. bolt-on 90-degree
(spring type included)
Pipe Paris* AL700



The Futaba 3-channel PCM receiver on top is wrapped in a balloon for waterproofing. Below is a 5-cell, 1000mAh receiver pack that delivers enough power for hours of running.

brakes, but this system isn't as easy to adjust as one that has two separate rods. For more front braking, you can install stiffer springs between the rear brake pads. All these features are bolted to a slightly longer, hard-anodized chassis. I don't think that the approximate 1/4-inch increase will affect handling much, but it might on a large track.

ASSEMBLY

Assembly was a little harder than it has to be. I've owned a Pirata for a long time, so I know where each screw goes, but a newcomer would have a hard time with the kit's manual. It's basically the instruction book from the original car with a book of assembly hints written in bad English: "Place aluminum chassis brace rod between

OPTIONS AS TESTED:

O.S. RX-B engine; K&N* air filter with foam pre-filter; Futaba PCM radio; Futaba 9301 for throttle and 9302 for steering; Sanyo 1000mAh 5-cell pack; SCI BEC guardian, McCoy* MC-9 plugs; Blue Thunder* racing fuel; body by Bich'n Bodies*.

HITS

- Aluminum diff cases • Steel gears • New body • New hard shocks • Twin disk brakes
- Stronger A-arms • Chassis brace

MISSES

- Difficult instructions • No turnbuckles or rear universals • Needle bearing for clutch bell

front and back shock tower. Hole have been drilled all ready for this reason." The instructions help a little, but I think that it's time for the RS to have its own comprehensive instruction book.

You might want to get a set of turnbuckles for the upper links. A competition-level car should come with them. I bought a set of titanium turnbuckles for the Pirate RS that are very beefy!

PIECES OF POWER

For power, I rebuilt an O.S.* RX-B from parts. My friend and I each had one with a bad piston and sleeve. My carb was broken; his was fine. I bought a new piston, sleeve, connecting rod and wristpin. I completely disassembled the engines, cleaned the parts and inspected them. I picked the best set of bearings and the least worn crank, and I began to reassemble. I must admit that it looks like new and has great compression!

The kit's clutch is a good, three-shoe design. The kit comes with a flywheel for the O.S., so I was lucky. I was a little disappointed to find that the kit's clutch had a needle bearing, not ball bearings. A needle bearing requires careful attention and must be greased well. If it blows, the bell goes out of round and chews up the main gear. So for peace of mind, I replaced it with ball bearings.

When I mounted the engine on the drive system, I found that the machined main gear was a little out of round. I adjusted it so that it didn't bind and went for it; it will wear in.

TELEMETRY

I used my Futaba* PCM radio system with a 9301 servo for the throttle and a 9302 for steering. The 9302 has 99 in.-oz. of torque for steering. The 9301 provides more than enough for throttle and brakes. I used a 5-cell, 1000mAh pack for power. The cells are a little bigger than necessary, but the duration is worth it.

For safety, I used a BEC Guardian by SCI*. It was designed to alert you when too much voltage goes to your receiver from your BEC system, but it can also be used as a voltage indicator. When your battery pack is fully charged, red and green lights indicate that it's at more than 4.8 volts. (The pack's



Large, hard-anodized, oil-filled shocks provide ample damping and will last a long time. Notice the threaded body for spring adjustment.

capacity is 6 volts.) As the pack drains, the red light goes off (leaving only the green light), and this tells you that the pack is at 4.8 volts. At this point, the voltage of each cell is just a little more than 1 volt, so you should charge the pack very soon. By the time the green light goes out and the yellow one comes on, the pack is dead. Don't even try it!

PERFORMANCE

I was amazed that the engine sparked to life with one hit of the starter! A little fiddling with the needle, and the car was off and running. I set the engine rich for the first four tanks because I had to break in the new piston and sleeve.

The center diff worked very well and didn't fling grease from the seals. Power didn't transfer too much to the front end during acceleration. After a full day



To keep the dirt out of the O.S. RX-B, I used the Paris/K&N air filter. I added a foam pre-filter and oiled it with K&N foam filter oil. The foam filter oil is very sticky and catches most dirt before it can reach the filter inside.

of running, I was sure that I was driving the M-1 Pirate that I spent a year and a fortune on. The suspension was super-smooth on the rough stuff, and jumps were clean and level. The kit's X-pattern tires work well on hard dirt. The three-spoke rims look a little weak, but they're actually very strong.

Hey, I know! RS means that it comes with all the hot Racine® Stuff!

**Here are the addresses of the companies mentioned in this article:*

Pirate; imported by OFNA; distributed exclusively by Horizon Hobby Distributors, 4105 Fieldstone, Champaign, IL 61821; (217) 355-0022.

Kyosho/Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826; (217) 398-3630.

O.S./Great Planes Model Distributors, Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718; (714) 455-9888.

SCI Corp. of America, P.O. Box 13099, Sarasota, FL 34278. ■

TRINITY®

FREE POWER



There's nothing I like better than finding a quick and easy way to get more horsepower from a motor—especially if it's free! By free, of course, I'm talking about more power without an increased drain on the batteries. At Trinity, we offer two products which, when used separately or together, will definitely increase power: our RC4102 "Motor Sleeve" and our 4471 "Laydown Brush Conversion Kit."

The motor sleeve is a totally clever (and legal) way to sidestep the ROAR rules on motor-can thickness. Because this iron sleeve is *not* a part of the motor (like a heat sink), it is legal. It increases the magnetic field around the armature. The thicker the motor can, the more power your motor will make. What you must remember when using the motor sleeve is that more torque is produced at a lower amp draw. You must gear up the motor to take advantage of this fact. In fact, our Point Blank drag-racing team has been using this to break all the records in the classes in which they compete. It has become a necessity.

By now, I hope that you have tried our Laydown Brushes in some of your modified motors. We have had nothing but success with them. As the brush wears in, the armature pole fires longer, and, of course, we all know that this means "free horsepower." Add both to your modified or stock motor, and you'll be able to see a difference. Just remember to gear up your motor after the changes.

What we have done in both cases is to increase the motor's efficiency. This makes it draw lower current and produce slightly less rpm than before. Now if you increase the amp draw to what you had before, the rpm will increase and your motor will definitely be faster.

*Until next month,
Neal McCurdy
Trinity Team Manager*

ADVERTISEMENT

Embattled in

Team Yokomo '93. Masami Hirose (on right) shakes the hand of up-and-coming teammate, 13-year-old Shinnosuke Adachi. Adachi is being touted as the "next Masami" in Japan.



EVERY TWO YEARS, the International Federation of Model Auto Racing (IFMAR) sanctions the hottest 1/10-scale off-road race, and two World Champions are crowned. One title is for 2WD, the other for 4WD. Now, sit back and think about that for a minute. World Champion. That title would give you boasting rights for being the best in the world; there would be no better driver on earth. When it comes to R/C car racing, you would own the planet.

This prestigious race attracts the globe's best off-

road racers. Participants from countries such as the U.S., Japan, Ireland, England, South Africa, Greece, Italy, France and Sweden (just to name a few) travel abroad for the event. Not just anyone can race for the titles, though; only a select group from each country is chosen to compete.

To get to the World Championship level, you must first qualify. Each country or sanctioning organization, i.e., EFRA (the European Federation of Radio Operated Automobiles), FEMCA (Far East Model Car Association) and our organization, ROAR (Radio Operated Auto Racing), has 40 slots available for racers. FAMAR (the Fourth Association



A 2 WORLD CHAMPIONSHIPS

England



by John Howell



Model Auto Racing) is allotted 10 spots. Each organization has its own qualifying standards for the Worlds. In our country, to get to the Worlds, you must have been a finalist in either the 2WD or the 4WD A-Main at the previous Worlds; the rest of the slots are filled by the top A-Main ROAR Off-Road National 2WD and 4WD finishers.

At the '91 Worlds, 12 ROAR racers filled both the 2WD and 4WD A-Mains. With 28 slots left, the 14 top-finishing drivers from the 2WD and 4WD Classes at the Off-Road Nats were eligible.

In the case of repeat eligibility (some drivers who qualified because of their placing in the '91 Worlds also qualified for their placing in the 2WD and 4WD Mains at the Off-Road Nats), racers were picked from lower 2WD Mains at the Nats.

Because some drivers backed out of the race for a variety of reasons, some drivers submitted resumes, hoping to be chosen as alternates. Thirty resumes were sent to the IFMAR committee, and the board members voted on which drivers they felt should advance to the Worlds.



Gil Losi and Jim Halsey take in some local color.

INSIDE THE WINNING CARS

BRIAN KINWALD'S RC10 TEAM CAR

After winning the '89 and '91 World Championships using prototype Stealth RC10s, Team Associated decided that, for the Basildon track, its standard-issue, aluminum-chassis Team Car would work best—evidently, it was the right choice!

Brian's car is very much the same Team Car that you or I can buy at the hobby shop. It was meticulous preparation and a thorough knowledge of car setup (not to mention brilliant driving) that netted Brian his first world championship title.

Brian's car has a hard-anodized "works" tub chassis that was lightened by having its sides cut down slightly, and wherever possible, its square edges were rounded off. (At this level of competition, every bit counts!) Up front, it has special arms molded out of a more rigid, graphite material. Brian used the standard Associated long front shocks with number 1 pistons and .060-inch-thick, travel-limiting spacers; he filled them with Associated 30WT, 100-percent-silicone oil, and installed Black springs. The front shocks were

mounted to the custom graphite shock tower in the upper middle hole and to the suspension arms in the outside hole.

Brian likes the steering response he gets from his Airtronics 94737 servo, which actuates a set of Composite Craft ball-bearing steering bell-cranks. All of the stock linkage was swapped in favor of RCPS titanium turnbuckles, and for additional weight savings, RCPS titanium hinge pins take the place of the kit's heavier steel pieces. A pair of Pro-Line's new 8105 XTR Wide 5 ribbed front tires ride on Associated three-piece rims. These heavier rims seem to provide a little more steering.

Additionally, Brian set his car's front wheels to have approximately 2 to 3 degrees of negative camber.

For the rear suspension, Brian once again used Associated's number 1 pistons and 30WT silicone oil.

The travel of the standard Team Car long rear shocks was limited by the installation of .090-inch-thick spacers. Green springs were added, and then the shocks were

mounted to the inside holes of a custom graphite rear shock tower and the outermost holes on the graphite rear arms. Inner arm mounts that have 1½ degrees of toe-in are combined with 1½-degree hub carriers to give Brian's rear wheels a total of 3 degrees of toe-in per side. A new hole was drilled in the rear suspension bulkhead, and that moved the upper camber link's mounting position .180 inch outward from the stock position.

For big bite in Basildon, a set of new Pro-Line 8086 XTR Flat Stubbies (with foam inserts) were mounted on Associated's 2.175-inch rear rims.

Brian's Stealth transmission is essentially stock, though he did use Losi's Hydra Drive system and Associated's Teflon-sealed ball bearings. M.I.P.'s CVD joint drive shafts

Associated's graphite arms are more rigid than the stock, nylon arms. Pro-Line's new Wide 5 front tires were used to win the 2WD title.

RACING R/C CARS is a combined effort of man and machine, and both must be in top form to win a world championship. Brian Kinwald and Masami Hirose have proven themselves to be the best off-road drivers in the world, but what about their cars? Were special parts involved—items unobtainable by the masses? Which setups proved the best on the very fast, slick Basildon track? If you need to know, read on.

Brian used a Losi Hydra Drive slipper to conquer the slick British track.

A custom-made graphite shock tower provides more strength than the stock, fiberglass piece.

Brian Kinwald's RC10 Team Car

replaced the stock universals for smoother power delivery; and a set of six Reedy matched Sanyo 1700mAh SCRC cells powered a Reedy 12-turn, double-wind modified motor. The motor was geared with an 18-tooth pinion and an 87-tooth spur. On-board electronics consisted of Novak's 410-HPc HyperFET ESC and NER-3FM mini-receiver that Brian had covered with brass shielding, which he thinks increases its range. Topping off the Worlds' winning 2WD car is an RCPS Mirage body with a new ESC-cooling side scoop.

MASAMI HIROSAKA'S YOKOMO WORLD CHAMPIONSHIP SPECIAL

Masami used an all-new version of Yokomo's 4WD racecar called the World Championship Special. Previous "Works" Yokomos were based largely on the original Super Dog Fighter car, which was first used at the '87 IFMAR Worlds, but the World Champs Special is almost entirely new from the ground up.

The front portion of the new car's graphite chassis has roughly 5 degrees of kick-up, and a new, molded front bulkhead (previous models used magnesium and aluminum bulkheads) holds a pair of beefy-looking molded A-arms. Masami used a set of Associated hard-anodized, long front Team shocks, installed an Associated number 3 piston along with a 3mm spacer, and filled them with Yokomo number 500 silicone shock oil. To this assembly he added a set of Yokomo Silver springs, and then he attached the shocks to the car's thick, fiberglass shock tower.

Masami is known to drive punched, so he relies on a lightning-quick KO-Propo PS1001 FET servo for last-second steering corrections. Hirosaka is a Team Novak driver, so he uses a 410-HPc HyperFET ESC in all his cars. A trick-looking set of blue-anodized aluminum heat sinks keeps the Novak running cool. Horsepower comes in the form of six, Yokomo matched Sanyo 1700mAh SCRC cells wired to a Reedy 10-turn, double motor that's geared 87/16.

Masami controls his Yokomo with KO Propo's

The World Champs Special has many new features. Among them are these lightweight, aluminum drive hubs.

Esprit II stick radio. For reduced weight, Masami replaced his KO receiver case with one made of Lexan. I found it interesting that Masami soldered not one, but two, Schottky diodes to his motor. I guess he brakes a lot! If you look closely at the photos, you can see that Masami made a small "dam" out of rigid foam material to prevent dirt from entering the rear diff area and causing damage.

The rear of the car has an aluminum bulkhead that was modified to allow dirt and debris to exit the diff area. A fiberglass plate is mounted between the bulkhead and its cap to provide an attachment position for the adjustable rear camber links. Unlike previous Yokomos, the rear suspension arms are secured by molded mounts to the chassis, instead of to the bulkhead. Masami used a pair of Associated long rear shocks and attached them to a very tall, fiberglass "skyscraper" shock tower. Each rear shock contains an Associated

Masami Hirosaka's Yokomo

number 1 piston and a 10mm spacer, and was filled with Yokomo's number 350 oil. Associated's Green rear springs were also used. New wheels that use strengthening ribs both inside and out for more rigidity were developed for the World Championship

Special. A full set of new Pro-Line, 2.15-inch tires—8125 Flat Stubbies XTRs up front and 8086 Flat Stubbies XTRs in the rear—were mounted to these wheels. Foam inserts were placed inside each tire, and once the tires had been mounted to the wheels, Masami balanced them with thin lead tape using a derivative of a model airplane prop balancer.

Our congratulations go to Masami and Brian for their great accomplishments. They've proven that there's no magic involved in winning a World Championship, but that it takes hard work and meticulous car preparation—which anyone can do—to win big...if they want it bad enough.

World Championships '93

ONE TENTH OFF ROAD

28th July - 6th August
BASILDON

FMAR

WORLD

ETRA



ASSOCIATED ELECTRICS
PARMA INTERNATIONAL
T.E.M.A.C.

Name:

THAMES ESTUARY MODEL AUTO CLUB

The drivers who won on a point ballot were (in no particular order) Scott Roberts, Rick Hohwart, Scott Brown, Brad and Brett Reelfs, Scott Hughes, Aaron Biner, Darrin Stump and B.J. Christensen.

At the Worlds, you must go through six rounds of qualifying for both 2WD and 4WD, then you race your Main. If you qualify well, and happen to be one of the lucky 10 counted among the elite in the 2WD A-Main, you can run one practice Main and three actual A-Mains. A win in one of the Mains equals 10 points, second place equals nine and so on. Total points determine the overall World Champion. The setup for 4WD was similar, but drivers didn't run a practice Main.

This year, the World Championships were held at the T.E.M.A.C. track at the Pipp's Hill Leisure Complex in Basildon, England (a small suburb of London), during the last week of July and the first week of August. Following tradition, the running order of the event went as follows: open practice; 2WD practice; 2WD Mains; 4WD practice and qualifying; and 4WD Mains. An awards ceremony followed the 4WD Mains. The final step was to board that plane headed toward home, with trophy in hand.

BLAST FROM THE PAST

Just to refresh your memory, let's flip back to the '91 Worlds in Detroit, MI. Japan's Masami Hirosaka walked away with the 2WD title, and Cliff Lett of Team Associated snagged the overall in 4WD.

Would both of them be able to repeat their performances this time? Cliff had been busy with R&D at Associated, and according to him, he really hadn't had as much time as he would have liked to prepare for the race. Masami, on the other hand, had been driving like a madman, and his hard work showed recently as he displayed utter dominance at the Reedy Race in Livermore, CA. Could he pull off a repeat win at this Worlds?

Since the Detroit race, a group of fast drivers from the U.S. has emerged from the ranks and could very well pose a threat to the incumbent champions. Racers such as Mark Pavidis, Brian Kinwald, Scott Brown, Jon Anderson, Derek Furutani and Scott



Team Schumacher '93. Left to right: Ben Sturnham, William Mitcham, Cecil Schumacher, Jurgen Lautenbach and Kevin Moore.

turers were at an all-time high between Team Losi, Associated, Traxxas and Schumacher. All the manufacturers had new cars or equipment, and all were eager to get the show on the road and prove who was best.

In the first round, Associated's Mark Pavidis set the pace as he ran 12 laps in 5:14. Mark was followed by teammate Matt Francis, Losi's Scott Brown, Team Trinity's Joel Johnson and John Koonce.

Round two rocked everyone as on-road specialist Joel, who was driving the all-new Losi Double-X car with Trinity horsepower, set the pace to beat with a 12-lap run in 5:08. Following Joel in second place was Scott, then Carlos Gonzales, local boy Craig Drescher and Masami. It seemed unlikely that anyone would beat Joel or Scott's impressive times.

In round three, Joel once again led the pack, but he didn't break his previous TQ run. Following Joel in this round were Brian Kinwald, John, Ben Sturnham and Sasha Falter.

Matthew Needham was the fastest racer in round four; he completed a 12-lap run in 5:22.3. Unfortunately for him, this wasn't even close to the TQ. Following Matthew were Joel, Scott, Jay Halsey and Masami.

In round five, "Mr. Consistency," Joel, was back on top.

2WD CLASS (150 Drivers)

Round	No. (%) Who Ran Best Run
1	37 (24)
2	32 (21)
3	37 (24)
4	17 (11)
5	13 (8)
6	14 (9)

10,930 total laps 299 were hand-counted Computer efficiency—97.25 percent

4WD CLASS (150 Drivers)

Round	No. (%) Who Ran Best Run
1	3 (2)
2	11 (7)
3	25 (16)
4	25 (16)
5	35 (23)
6	51 (34)

Roberts all have what it takes to be a champion, and some already are. Could one of them take home a world title? Possibly....

2WD QUALIFYING

Generally speaking, the competition in the 2WD category was more intense than that in the 4WD class. Rivalries between car manufac-

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but slightly off his TQ pace. He was followed by Rick Hohwart, Ben, Matt Ledger and Brent Wallace.

Masami Hirosaka picked up the pace in round six, but he was nowhere near the early TQ set by Johnson. Following Masami were Brian, Joel Johnson, Scott Brown and Jack Johnson.

The A-Main was decided. On-road racer Joel shocked the off-road world by taking the TQ spot. He was followed by Scott, Mark, Matt Francis, Carlos, Craig, Masami, Brian, John and Matt Ledger. Now that the Mains were all set, it was back to the hotel room to start some late-night thrashing on their machinery for the upcoming races.

PRACTICE MAIN

The next morning, everyone in the A-Main was tweaking his car at the last minute in preparation for the practice Main. It was only a practice race, so no points were awarded. But it offered the racers a chance to test their cars under actual race conditions. That way, everyone would be fully prepared for the "real deal."

The adrenaline was rising as the cars were set on the grid, and the racers gunned the throttle to check their slipper settings. Spectators eagerly watched as the buzzer sounded, and polesitter Joel grabbed the early lead. Eventually, eighth qualifier Brian charged from the back of the pack and took the win. As soon as the track had been cleared, all the racers scrambled back to the pits to fine-tune their cars before the start of the first leg of the triple A-Mains.

2WD A-MAINS

First Leg

With the practice Main behind them, it was time to get the real show on the road. Unfortunately, as the cars lined up on the grid, the weather became fouler by the minute. Splotches of rain began to hit the track, and

everyone worried that a down-pour would sweep through and that the track conditions would quickly begin to deteriorate.

The buzzer sounded, and Joel rocketed off the line and grabbed an early lead. He was quickly followed by his teammate Scott (aka Jason Priestly). Moving rapidly from eighth place through the pack was "Flyin'" Brian, who managed to get past Scott, then charged at the leader. Toward the end of the race, Brian made a pass on Joel, but Joel found a line, got back around him and crossed the finish line first. Brian held on to second place, and Scott followed in



third. Masami finished fourth, followed by Craig, Matt Francis, John, Mark, Matt Ledger and Carlos. Masami set the fastest lap in this leg with a time of 25.30 seconds.

Second Leg

At the start of the second leg, Joel once again grabbed the holeshot and led the pack early on, but—as he had done in the first leg—Brian moved quickly into position and took over the lead. The two battled, but this time, Brian held on to the lead and finished ahead of Joel by a little more than a second. Following Joel were Matt

WORLD CHAMPIONSHIPS



Brian speaks..

"Car Action" chatted with newly crowned 2WD World Champion Brian Kinwald to get his impressions. Here's how it went.

Car Action: Congratulations on your win, Brian. How does it feel to be World Champion?

Brian Kinwald: It feels really good. It's hard to put into words. I never really thought I had a chance until after the last qualifier when I got my car to work better. I'm glad that the race was in England. The people here really make a big deal over it, so you feel you've really accomplished something special.

C.A.: After your impressive showing at the ROAR and NORRCA Nats, do you feel that you're on a roll?

B.K.: I guess so. I don't feel that I've been lucky; I think I just race a lot more than most people. Because of where I live, I can race just about every night except Monday, so I rarely just go out and practice. I race on a club level. You learn more when you race.

C.A.: How did you prepare for this race?

B.K.: I didn't really do anything specifically for this race because there were so many races before the Worlds. I was ready. At club races, we had them set up five-minute heats so we could get used to the extra run time. I raced a lot at SoCal Raceway because its surface is fairly similar to the Worlds' track.

C.A.: What did you think of the Basildon track?

B.K.: I saw the track at the warm-up race, and I didn't like it much. The straightaway was super-long, and it was a horsepower track. When I showed up for the Worlds, they'd changed the track. There was a jump in the straight, and it was shorter—more of a driver's track. I liked the hard-packed surface because it had a lot of bite, but it was really rough, and I don't do that well on rough, outdoor tracks.

C.A.: Who was your toughest competitor?

B.K.: Before the race, I thought that Masami would win 2WD. At dinner before the race, Greg Hoddap told me that I would win. After qualifying, everybody in the Main was a threat, but Joel and Scott Brown were probably the toughest.

C.A.: What was your strategy in the A-Mains?

B.K.: Going into the practice Main, I didn't know how good my car would work. If it worked really well, I would play it down. If they thought I was out of it, they wouldn't expect me to come out through the pack.

After the first race, I knew I had to just beat Joel. In the second Main, Masami and I tangled on the start. Once I got going, I found that almost everyone else had crashed, and I came out in fourth and passed Joel and Craig [Drescher] over a jump. When Pavidis crashed, I got the lead. In the third race, whoever finished higher (Joel or me) would take the overall. My teammates let me go by, because they knew I had a chance of winning. Joel was leading, but he crashed, and that was it.

C.A.: Any parting thoughts for our readers?

B.K.: When you're not doing well, keep trying, and practice, practice, practice. It works for me!



What's next, anti-lock brakes? Traction Control Debuts

It's not uncommon for the Worlds to be a showplace for technical innovations. Occasionally, IFMAR steps in to define the boundaries of acceptable gadgetry. At this year's Worlds

Championship, the sophisticated TCS (traction-control system) developed by LRP (Lautenbach Racing Products) and a similar system by Swedish racer Anders Hansson were declared illegal for IFMAR competition before the event

officially began.

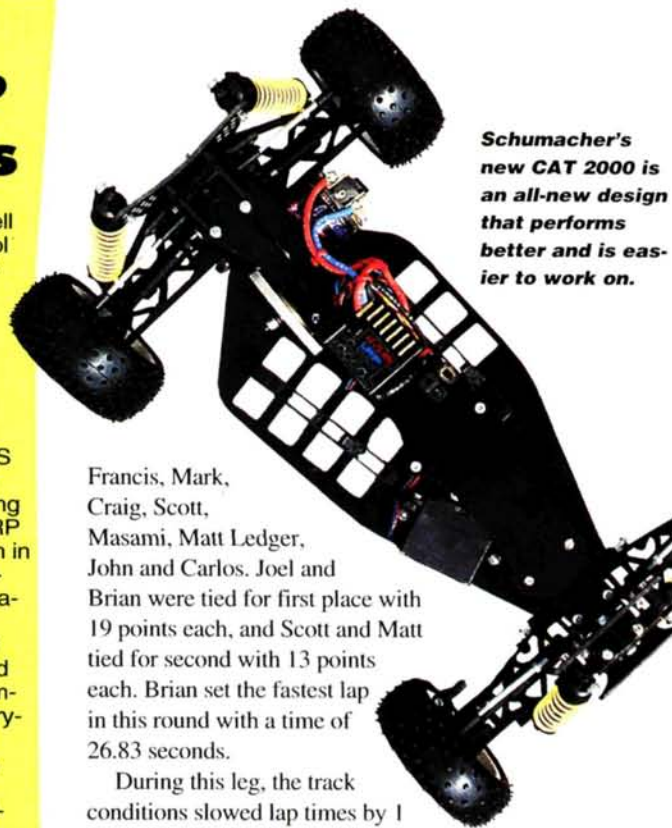
Both TCS systems are prototypes, though they seem to be very similar in design and function. Here's how they work: one magnetic sensor unit is attached to one of the front wheels of a 2WD racecar and another to the spur gear/clutch plate on the car's transmission. These sensors lead to a TCS module that's connected "in-line" between the receiver and the electronic speed controller.

If the sensor at the spur gear "reads" that the rear wheels are spinning faster than the front wheels (as read

by the front wheel sensor), it will tell the TCS module to alter the control pulse that's being sent to the ESC from the receiver (basically, by bypassing your throttle input). The current flowing to the motor from the ESC is limited until both sensors regain synchronous rotation, i.e., until the front and rear wheels spin at the same speed.

Both the LRP and Hansson TCS systems can be set to allow some wheel spin to retain the oversteering associated with 2WD cars. The LRP unit also has a "holeshot" provision in which the TCS is disengaged temporarily to allow maximum acceleration from a standing start.

According to IFMAR, the use of such traction-control devices would add to the already high cost of competitive racing, and if allowed, everyone would soon have them, so all advantage would be lost. Sources say that Hansson probably won't produce his TCS unit, but even following the IFMAR ruling, LRP may manufacture its system for non-IFMAR competitions.



Schumacher's new CAT 2000 is an all-new design that performs better and is easier to work on.

Francis, Mark, Craig, Scott, Masami, Matt Ledger, John and Carlos. Joel and Brian were tied for first place with 19 points each, and Scott and Matt tied for second with 13 points each. Brian set the fastest lap in this round with a time of 26.83 seconds.

During this leg, the track conditions slowed lap times by 1 or 2 seconds, and some racers were beginning to worry about surface conditions for the third leg. The championship would be decided in the next race, so all the racers wanted the best possible conditions. Unfortunately, it was beginning to look as if nature wasn't willing to cooperate; more rain clouds began to drift in.

Third Leg

Under an ominous gray sky, all the drivers scrambled to the starting grid to place their cars. Although not under water, the track was affected by the rain, but now we would see how bad things were. All eyes were on the cars as they sat on the grid, prepared to prove who was the best 2WD R/C driver in

VITAL STATISTICS—2WD A-MAIN QUALIFIERS

Qual. pos.	Name/country/sponsors	Car	Motor/batteries	ESC	Radio	Servo	Tires (F/R)	Pinion/spur
1	Joel Johnson (USA), Losi, Trinity Novak	Losi XX	Trinity 13x2/Trinity	Novak	Airtronics	Airtronics 94151	Losi/Losi	23:86
2	Scott Brown (USA), Losi, Lunsford, Novak	Losi XX	Revolution 13x2/Exell Racing	Novak	Airtronics	Airtronics 94151	Losi/Losi	20:88
3	Mark Pavidis (USA), Associated, Reedy, Pro-Line, Yokomo	RC 10	Reedy 11x4/Reedy	Novak	Airtronics	Airtronics 94151	Pro-Line/Pro-Line	17:86
4	Matt Francis (USA), Associated, Reedy, Pro-Line	RC 10	Reedy 12x2/Reedy	Tekin	Airtronics	Airtronics 94737	Pro-Line/Pro-Line	18:81
5	Carlos Gonzales (USA), Associated, Reedy, Team Orion, Peak Performance	RC 10	Peak Performance 13x2/Orion	Novak	Airtronics	Airtronics 94737	Pro-Line/Pro-Line	20:81
6	Craig Drescher (England), Associated, Reedy, Keil, KO Propo	RC 10	Reedy 12x2/Keil	Novak	KO Propo	Airtronics 94737	Pro-Line/Pro-Line	19:87
7	Masami Hirotsaki (Japan), Yokomo, Associated, Novak, Reedy	RC 10	Reedy 12x2/Yokomo	Novak	KO Propo	KO Propo 1001	Yokomo/Yokomo	17:87
8	Brian Kinwald (USA), Associated, Reedy, Pro-Line, Yokomo	RC 10	Reedy 12x2/Reedy	Novak	Airtronics	Airtronics 94737	Pro-Line/Pro-Line	18:87
9	John Koonce (USA), Losi, Trinity, Novak, Hobby Trax	Losi XX	Trinity 14x14/Trinity	Novak	JR Propo	Futaba 9401	Losi/Losi	24:86
10	Matt Ledger (USA), Associated, Reedy, Novak, Yokomo	RC 10	Reedy 11x5/Reedy	Novak	JR Propo	JR 4735	Pro-Line/Pro-Line	17:86



the world. As the buzzer sounded, Joel grabbed the lead, followed by the freight train A-Main. Joel led for a while, but suddenly, his car hit a divot and turned over on its lid. This allowed Brian to take the lead and blast away.

Joel tried to catch up with the leader, but he had lost too much time and too many positions. Brian held on to the lead to the end and was declared the new World Champion.

Following him was England's pride and joy, Craig, then Masami, Joel, Matt Francis, Scott, Matt Ledger, Mark, John and Carlos. The fastest lap during the race was once again set by Masami as he burned around the track in 26.76 seconds.



Here we see the real brains behind Masami Hirosaka's success. Wait a minute! Get Doogie outta there!

4WD QUALIFYING

After the 2WD qualifying and Mains, the drivers quickly focused on their four wheelers. The track was groomed between the 2WD finals and the start of 4WD qualifying. The atmosphere of the event lightened up, and there seemed to be a little more camaraderie between the racers.

After the first round of qualifying, it was obvious that Masami wanted the title in the worst way. He set a blistering pace—one that



Smilin' Gene. Wouldn't you be smiling if your car won the Worlds?

I was impressed with a lot of things at the Worlds. I got to watch some very intense racing, meet interesting people, see the sights in London, and hang out for two weeks with some racers I usually only see for a few days at smaller races. That's one of my favorite parts of covering races—hanging out with all the racers. Most of them are really cool people.

the track area *picking up trash*—not just from the track, but also from the outside spectator area! I couldn't believe what I was seeing. One of the race officials pulled me to the side and said, "Masami gets here early every morning and does the same thing, and every day, he's the last one to leave. He just goes around picking up

being a complete Winner

It takes more than being fast on the track!

One of the more interesting people I hung out with was Masami Hirosaka, a very quiet guy who is always hard at work. Since Masami does understand English slightly, we were able to talk here and there throughout the event.

I especially noticed Masami's politeness. One day, when I stayed late at the track to get the final qualifying results, I noticed Masami walking around the perimeter of the track, picking things up off the ground. As I watched for a few more minutes, I finally realized what he was doing: he was walking

trash after everyone's left. I've never seen anything like it."

I walked up to him and asked him what he was doing. He smiled and said, "Just cleaning up a bit," and continued to pick up soda cans and napkins off the ground.

I went back to the hotel thinking, "What a cool guy. He comes over to England and really goes all out. He sets a great example—one that other people should follow." Instead of going out every night, getting drunk and destroying his hotel room,

Masami showed everyone what it takes to be a world-class racer. I'm not saying that everyone should go around picking up trash at every race they go to, but show respect when you're at a big event. Don't be a spode! Besides, if you're really cool, maybe we'll write a sidebar about you, too.

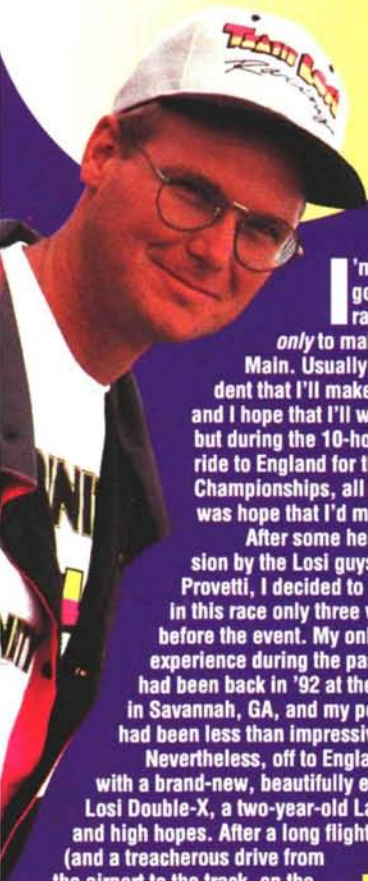


4WD A-MAIN QUALIFIERS

Qual. pos.	Name/country/sponsors	Car	Motor/batteries	ESC	Radio	Servo	Tires (F/R)	Pinion/spur
1	Masami Hirosaka (Japan), Yokomo, KO Propo, Pro-Line, Reedy, Novak	Yokomo World Champs Spec	Reedy 10x2/Yokomo	Novak	KO Propo	KO Propo	Pro-Line/Pro-Line	16:87
2	Ben Sturham (UK), Schumacher, Tanaplan, Orion, Nosram	Schumacher Cat 2000	Tanaplan 11x2/Orion	Nosram	JR Apex	KO Propo	Schumacher/Schumacher	15:95
3	William Mitcham (UK), Schumacher, Corally, Nosram, Galeforce	Schumacher Cat 2000	Corally 12x2/Orion	Nosram	KO Propo	KO Propo	Schumacher/Schumacher	16:92
4	Rick Hohwart (USA), Yokomo, Orion, Peak Performance, Novak, Futaba	Yokomo World Champs Spec	Peak Performance 12x3/Orion	Novak	Futaba	Airtronics	Pro-Line/Pro-Line	18:87
5	Shinnosuke Adachi (Japan), Yokomo, Reedy, Sanwa, Pro-Line, Associated	Yokomo World Champs Spec	Reedy 11x2/Yokomo	Sanwa	Sanwa	Sanwa	Pro-Line/Pro-Line	17:87
6	Kevin Moore (UK), Schumacher, MPH, LRP, KO Propo	Schumacher Cat 2000	LRP Magic/LRP	LRP	KO Propo	KO Propo	Schumacher/Schumacher	15:95
7	J.D. Beckwith (USA), Reedy, Associated, Novak, Orion, Yokomo	Yokomo with Dukes Accessories	Reedy 12x2/Orion	Novak	Airtronics	Airtronics	Pro-Line/Pro-Line	18:87
8	Mark Pavidis (USA), Associated, Reedy, Pro-Line, Yokomo, Novak	Yokomo World Champs Spec	Reedy 11x2/Reedy	Novak	Airtronics	Airtronics	Pro-Line/Pro-Line	16:87
9	Derek Furatani (USA), LRP, Yokomo, Associated	Yokomo World Champs Spec	LRP Magic/LRP	LRP	Airtronics	Airtronics	Pro-Line/Pro-Line	17:87
10	Joel Johnson (USA), Trinity, Losi, Kyosho, Novak	Kyosho Lazer ZX-R	Trinity 11x5/Trinity	Novak	Airtronics	Airtronics	Losi/Losi	20:100

A Magic View

by JOEL JOHNSON



I'm not used to going to a race hoping only to make the A-Main. Usually, I'm confident that I'll make the final, and I hope that I'll win the race, but during the 10-hour plane ride to England for the Off-Road Championships, all I could do was hope that I'd make the A.

After some heavy persuasion by the Losi guys and Ernie Provetti, I decided to participate in this race only three weeks before the event. My only off-road experience during the past two years had been back in '92 at the Truck Nats in Savannah, GA, and my performance had been less than impressive.

Nevertheless, off to England I went with a brand-new, beautifully engineered Losi Double-X, a two-year-old Lazer 4WD and high hopes. After a long flight (and a treacherous drive from the airport to the track, on the left side of the road), Mike Dunn and I arrived at the T.E.M.A.C. track in Basildon, England.

We had a first glance at the track, and it looked great, with elevation changes and elaborate landscaping. Mike's first comment was, "Another Worlds track that's as hard as a rock and has only two jumps." When I looked at the track again, I felt that I might have a chance after all. It looked a little like the '87 Worlds track (a track I'd raced on successfully), and I knew I'd have plenty of practice runs over the next five days to find out if it was.

Practice went well for me; I was never the fastest, but I always turned in consistent, competitive times. My philosophy was to run for five minutes without crashing and let the speed take care of itself. My Losi Double-X and the Trinity motors I used performed flawlessly. The car only required two minor setup changes, and the motors and batteries ran fast for five minutes without a problem. By the end of practice, the track had many ruts in the lines, but the new Losi car seemed to handle them just fine, and the ruts seemed to be to our advantage.

When qualifying started, I was a little nervous

about doing well in my first heat, but I was successful and ran an A-Main time. Things were looking up: I was near the top of the A-Main at this point, and my teammate Scott "Jason Priestley" Brown was top qualifier. In my second heat, I turned in a perfect run that made me top qualifier by 1 second over Scott. At the end of the day, I was still on top and hoped I would still be there at the same time the next day.

As the second day of qualifying started, I saw that the track was becoming badly rutted, and A-Main times were few and far between. So, the day ended with many handshakes and congratulations for my TQ. Five days before that, I would have been happy to have been 10th qualifier and to have finished in the top eight. Now I knew I wouldn't be happy unless I won.

As the buzzer sounded for the start of the first final, I got a good jump on the field and led for the first few laps. While I was driving, I noticed that the track had deteriorated badly and that driving fast without a mistake was difficult. At around 2 minutes down, I made an error, and this allowed Brian Kinwald to take the lead. Two laps from the end, at the top of the hill, I made a pass that put me back in the lead, and I went on to win the first Main.

The second Main started in the same way as the first, except that, because of rain, the track was wet. Again, I made a mistake, Kinwald got by, and we finished just a second apart. We were tied and it would all come down to the last Main.

At the beginning of the last Main, I got a fairly good jump on the field. This time, I was determined to run a perfect race, but sure enough, in the middle section of the track, a pothole grabbed one of my front tires and rolled my car; and Brian was there to capitalize. The rest is history.

Looking back at this race is tough for me, because I'm not used to giving up the lead once I've gained it. It seemed as though it just wasn't my turn this year. It was great being TQ, but I



Joel's top-qualifying Losi Double-X 2WD racer with Trinity horsepower à la Neal McCurdy. Losi's new Gold compound tires were the hot ticket.

sure would have liked to have brought home another World Championship for the USA, Trinity and me; I especially wanted to give the Losis their first World Championship.

Thanks to Gil Losi Sr., Gil Jr. and all the guys from Team Losi for the best car at the race and for all the help they gave me. And thanks to Neal McCurdy from Trinity for the superb job he did with the motors and batteries and, oh yeah, congratulations to Brian on a job well done. Let's try it on pavement sometime.

had most racers shaking their heads and some commenting, "OK, now all I have to do is find a few seconds a lap, and I'm dialed!" Masami's new Yokomo—the Yokomo World Champion Special—was on rails, and it seemed as if no one would be able to touch his fourth-round TQ run of 13 laps in 5:26.7—that is, until round five, when England's own Ben Sturham had a nearly flawless run and set the new pace of 13 laps in 5:26 flat.

But Ben's time as king of the hill was short-lived; Masami came back in the sixth round and literally destroyed the TQ run as he ran 13 laps in 5:15 flat. Sturham was relegated to second qualifier, and rounding out the A-Main positions, in order, were England's William Mitcham (3), the USA's Rick Hohwart (4), Japan's Shinnosuke Adachi (5), England's Kevin Moore (6) and the USA's J.D. Beckwith (7), Mark Pavidis (8), Derek Furutani (9) and Joel Johnson (10). Because there was no practice, the drivers went back to the hotel and prepared their cars for the next day's racing. The cars had to be in ultimate condition. There would be no testing before the race.

4WD A-MAINS

First Leg

Cheered on by local fans and spectators, the drivers maneuvered onto the drivers' stand, one by one. Once the cars had been set on the grid, it was crunch time.

As the buzzer sounded for the first leg of the triple A-Main, Masami jumped out to an early lead, followed by teammate Shinnosuke Adachi. On the Japanese racing circuit, 13-year-old Shinnosuke is touted as the next Masami. Could he upset his home country's hero?

Masami pulled away from him, but both stayed well ahead of the pack—by at least a quarter of a lap—and were never pressured throughout the five minutes. Masami walked away with the win, and that set the stage for the next two Mains. Everyone thought that he would be tough to beat, but not *this* tough.

Rick Hohwart took third, followed by Ben, Kevin, J.D., William, Mark, Joel and Derek. Masami set the fastest lap of the first leg with a time of 22.85 seconds. He was also the only driver in the entire race to turn a



Saigon kick! Here, Brian Kinwald accepts his 2WD World Championship trophy.

motor madness

You gotta play by the rules! As soon as the 4WD Mains were over and all the cars were sent back to tech inspection, all hell broke loose. It seemed that someone had run an illegal motor during the last leg. Had he been running it during all three legs or just the last one? Would IFMAR's Technical Committee disqualify the racer?

The word quickly spread around the pits that the perpetrator was Schumacher's Ben Sturnham. The motor in question was his Tanaplan, which was made up of a purple Epic can and armature with a Yokomo endbell. Apparently, Ben's motor man, Martin Finnesey of Tanaplan Motors, didn't know that the modification was illegal in IFMAR competition (it's legal under England's BRCA rules), but the IFMAR rule clearly stipulates that no hybrids (motors made by mixing parts from approved motors) are allowed.

As soon as he heard about the situation, Martin quickly scrambled to the area where the judges were



Rick Hohwart (left) listens as Cecil Schumacher (right) and Martin Finnesey (middle) of Tanaplan motors argue their side of the motor controversy.



Ben Sturnham was relegated from third overall to 10th.

was his motor man's responsibility to know and follow the sanctioning body's rules, whatever they may be.

This statement was later issued by the jury:

The ruling of the Technical Committee will stand in regards to the motors deemed illegal in the Four-Wheel A Finals. This decision is taken recognizing that the driver had no foreknowledge of the modification to his motors and we feel that in no way it should reflect in an ill way on the character of the driver.

It's a shame that this had to happen to Ben. But, rules are rules...

22-second lap, and he did this three times. No one else broke even the 23-second mark. It didn't look as if anyone would be able to get within striking distance of Masami.

Second Leg

Because Masami won the first leg in such impressive fashion, he was the odds-on favorite to win the second leg, too. All eyes were on him and his Yokomo as the buzzer sounded starting the second A-Main. He shot off the line like a bullet. Ben, William and Rick were in hot pursuit, but Masami once again seized the victory. He also set the fastest lap of leg two with a time of 23.3 seconds. Crossing the line in second place was Ben, followed by Kevin, William, Mark, J.D., Joel, Derek, Shinnosuke and Rick. With this win, Masami clinched the overall 4WD World Championship title. He didn't even have to finish the third and final leg; he'd still be champ. The question was: would he go all out and try to make it three for three?



King of the four-wheelers, Masami Hirosaka, proudly accepts his TQ and World Championship trophies.

Third Leg

With the championship already decided, the race for second place was under way. As the buzzer sounded, Masami jumped out to an early lead (true to form), but he was soon pressured by Schumacher's Ben and Kevin. Both passed Masami as he got tied up in one of the turns, but



Joel Johnson accepts his 2WD TQ and second-place trophy. Almost, Joel, almost.

Masami to take over the first and second positions. At the end, Kevin crossed the line first, followed by Masami, Ben, J.D., William, Shinnosuke, Mark, Derek, Joel and Rick. Once again, the fastest driver on the track during the third leg was Masami with a time of 22.87 seconds.

As soon as the race had ended and all the cars had been teched, there was a controversy. One of the cars wasn't within the legal specs. The pits were buzzing with talk about whose car it could be. Was it cheating, or a simple error? What would happen to that racer? Would he be disqualified?

It turned out that the racer in question was Ben. Apparently, his motor man, Martin Finnesey of Tanaplan Motors, mixed and matched motor components, and this is illegal under IFMAR rules. Unfortunately,

OVERALL STANDINGS

(Combined results after three legs)

1. Brian Kinwald (USA)
2. Joel Johnson (USA)
3. Craig Drescher (England)
4. Masami Hirosaka (Japan)
5. Matt Francis (USA)
6. Scott Brown (USA)
7. Mark Pavidis (USA)
8. Matt Ledger (USA)
9. John Koonce (USA)
10. Carlos Gonzales (USA)

(Combined results after three legs)

1. Masami Hirosaka (Japan)
2. Kevin Moore (England)
3. William Mitcham (England)
4. Shinnosuke Adachi (Japan)
5. J.D. Beckwith (USA)
6. Mark Pavidis (USA)
7. Rick Hohwart (USA)
8. Joel Johnson (USA)
9. Derek Furutani (USA)
10. Ben Sturnham (England)

Ben—who was unaware of this modification—was dropped from second overall to 10th. (For more on the fiasco, see the accompanying sidebar.)

Car Action congratulates both Brian Kinwald and Masami Hirosaka for their spectacular wins. All their hard work and effort really paid off. I also thank race director John Newton for helping me out as much as he possibly could during such a hectic event and Associated Electrics and Parma/PSE for sponsoring the race.

Vantage Engineering DISCHARGER

**The Model 25A
discharger is
small, simple and
rugged. What
more could you
ask for?**

by STAN VanDRUFF

Bringin' it Down

IF YOU LOOK in the pits immediately after a race, you'll probably see a dozen glowing lights—homemade dischargers made of light bulbs. Most racers know the importance of discharging their batteries completely before recharging them.

Until now, the easiest way to do this at the preferred 20 to 25A rate was to make your own discharger by soldering together 12-volt automobile light bulbs. Vantage Engineering* has introduced a much neater (and somewhat safer) way to drain your batteries. Their Model 25A discharger was designed to extinguish those glowing lights in the pits.

The \$69 (list price) Model 25A discharger is a simple, rugged unit that measures 2x2.5x7 inches. Two high-wattage, 1/2ohm resistors are mounted in parallel inside the large, aluminum heat sink. Two 14-gauge leads with alligator clips can be connected to any 6-cell battery, and a small, red LED goes off when the battery's voltage drops below 5 volts.

The inside of the Model 25A is clean and simple; it has only five components. Unfortunately, the discharger isn't regulated, and it doesn't shut off automatically when the battery reaches 5 volts.

UNPLEASANT MEMORIES

What does a Ni-Cd battery have in common with an elephant? Memory—that's what. An elephant's legendary memory is the source of a hundred jokes, but R/Cers don't joke about Ni-Cd memory. When a Ni-Cd battery isn't cared for properly, its memory can severely reduce performance. A battery won't remember your birthday, but it will remember how you treat it.

If you only charge a Ni-Cd to 80 percent capacity, it will remember. If you fully charge a Ni-Cd—but only use 80 percent of its power before you recharge it—it will remember that, too. In either case, it won't be long before it will hold only an 80-percent charge. It's easy to charge a battery to 100 percent, but it takes extra effort to make sure it's discharged properly.

There's some evidence that Ni-Cds remember the rate at which they were discharged, too. The safest bet is to fully discharge your batteries at a consistent rate. During a race, your motor draws an average of 20 to 25 amps, so unless your battery dumps at the end of a race, you should remove it from your car and continue to discharge it at the same rate.

Because the discharger isn't regulated, its current draw depends on the number of cells in your battery. (It will draw whatever the battery can put out.) You can use the Model 25A to discharge 7-cell packs (although it will draw close to 30 amps), but you can't use it to discharge 4-cell packs, because the LED only works with 5 volts or more. The voltage of 4-cell packs isn't sufficient.

The instructions warn that the discharger's heat sink will get hot, and it will. (Don't you think those auto taillight bulbs get hot?) If you can discharge your batteries in less than 1 minute, everything will be OK, but if you discharge for more than 1 minute, use a fan to blow cooling air across the heat-sink fins.

For instance, after one day's run, I still had one fully charged battery that I knew I wouldn't use for a week. I connected it to the Vantage discharger, but I didn't have a fan to cool it. When the LED went out—about 3½ minutes later—the discharger was extremely hot. It wasn't exactly glowing red, but it was way too hot to pick up and toss into my plastic toolbox. Thanks to its large heat sink, it cooled down quickly once the battery had been removed, and it wasn't damaged.

The Model 25A is as rugged as a brick (and about as complicated), so it should last a very long time. I have only one complaint: it's difficult to see an LED go out—a buzzer would help—and since the discharger doesn't have automatic shutoff, you have to watch it closely. Discharging a battery too far can cause cell reversal and ruin it.

Connecting your batteries to light bulbs isn't the best way to discharge them, because with all the paper towels and motor spray in the pits, it's too easy to start a fire. Although the Vantage discharger does get hot, it's much cooler than light bulbs, and it's nearly impossible to break.

*Here's the address of the company that's featured in this article:
Vantage Engineering, 681 Main St., Waltham, MA 02154.

HOSTED BY RACERS' HAVEN in Bakersfield, CA, the 1993 NORRCA Off-Road Nationals was destined to become a historic event. NORRCA president J.R. Sitman and track owner/organizer Martin Buchanan supervised the event and worked vigorously to ensure that track conditions were consistent, the automated scoring system was operating properly and the transitions between races were quick and smooth. Starting technicians Lou Malbonado and Kent Finney were hard at work running the radio impound and making sure that all the contestants' cars and trucks met NORRCA's size and weight standards. Quick-witted race announcer Rick Kelsy provided all the play-by-play action.

This year's event was a full venue and included 500 contestants. Many of the major NORRCA- and ROAR-sanctioned events have to turn away entrants owing to the growth and popularity of R/C racing, and this year's NORRCA Nats was no exception. Many of the top drivers from all over the country came with one thing in mind—to capture the national championship. The factory teams from Team Losi, Team Associated and Traxxas were also present to compete in the Sixth Annual Team Cup Challenge. Each of the factory teams was allowed to choose the drivers who would compete in this event, and to keep things fair, all the teams had to be of equal size. The rule was simple; the team with the most points would win!

THE EVENTS

- 2WD Stock
- 2WD Modified
- Expert 2WD Stock
- Expert 2WD Modified
- Factory 2WD Modified
- Stock Truck
- Modified Truck
- Expert Stock Truck
- Expert Modified Truck
- Factory Modified Truck
- Expert 4WD Modified

That's right; there are 11 classes and four rounds of qualifying in each. That's a lot of racing! The factory and expert drivers faced triple A-Mains in which they earned points according to their finishing position (first=100 points, second=99 points, third=98 points, etc.). The best two Mains count, and the worst is used only as a tiebreaker.

FRIDAY, JUNE 25: DAY ONE

The first round of qualifying started at approximately 9:15 a.m., and the temperature was already over 100 degrees; it was hot! It seemed to get hotter and hotter as day rolled into evening, but by the time the last heat of the second round of qualifying was over, it was 9:30 p.m. and a cool 95 degrees.

Traction talk

The extremely hard track surface at the NORRCA Nats requires a tire that doesn't rely on penetration for traction. Pro Line's "Fuzzie" rear tires have hundreds of sharp mini-pins that actually scrape the track surface. Combined with the Fuzzie tire design, the new, softer XTR compound provides tons of traction on the hard-packed dirt, so it isn't any wonder that this was the most popular tire at the event.

Some of the Team Losi Drivers were experimenting with new prototype "gold compound" tires. The rubber on these tires is much softer than the original Losi HT rubber and has a high-density mini-pin design. They were extremely successful for the Team Losi drivers: Jack Johnson used a set to take first place in the Factory 2WD Modified Class, and Scott Brown—equipped with the same—took third.

Here's a spy shot of Team Losi's prototype tires. The new tires use a softer compound than Losi's HT rubber, and they have a high-density mini-pin design. Jack Johnson installed a pair on the front rims of his LX-T, but this combination wasn't so hot.



On Friday night, as Mike Smith, Kevin Manis and Greg Kapp of Boy Scout Troop 143 of Las Vegas, NV, slept, some "low-life scum" came along and swiped their R/C cars, trucks and some of their equipment. I really felt bad for the young scouts when I heard the news, and it reminded me of the time I had my car and an entire toolbox stolen at a race. Fortunately, there's a happy ending to this story: when the news of this heinous crime reached the ears of the factory drivers, they donated a brand new truck to each victim. Thank you, Team Losi, Team Associated and Traxxas.

SATURDAY, JUNE 26: DAY TWO

By the time I rolled in at 7 a.m., the racers were already hard at work setting up their cars for the next two rounds of qualifying. No doubt they were

At the NORRCA Nats, a cat burglar stole some cars, trucks and equipment that belonged to Boy Scout Troop 143 of Las Vegas, NV. Fortunately, there was a happy ending to this story.

FLASH—Cat burglar strikes the NORRCA Nats

burning the midnight oil the night before, and sleep was limited, but who could sleep under these conditions? The concours event started the day at 8 a.m. The trying job of judging fell into the hands of MIP's own Eustace Moore Jr. and Jane McMillan. The first-prize trophy went to Ed Garcia of Pismo Beach, CA, for his totally radical RC10T.

Second prize went to Ed Sly of Riverside, CA, for his tricked-out "Otter Pops" Traxxas LS-2. Cari Chappel took third prize for her meticulously detailed Motorcraft RC10T.

The third round of quali-

fying began at about 9:30 a.m. By noon, it was 109 degrees and climbing, and the heat was starting to affect the performance of the cars. Many drivers had to gear down or use a higher-wind motor to prevent nuclear melt-downs. Many also used heavier shock oil to last the full four minutes without turning into foaming mush.

By the time the last heat of the fourth and final round of qualifying was run, it was 9:30 p.m., so the racers had very little time to prepare for the next day's Mains.



The Track

Factory 2WD Modified

Top Qualifier: Jeremy Kortz 13/4:11.11

Pos.	Qual.	Name	Car
1	4	Jack Johnson	Team Losi Pro-SE
2	7	Bryan Peterson	Team Losi Pro-SE
3	5	Scott Brown	Team Losi Pro-SE
4	3	Brian Kinwald	Associated RC10
5	10	Mark Pavidis	Associated RC10
6	1	Jeremy Kortz	Team Losi Pro-SE
7	8	Greg Hodapp	Associated RC10
8	6	Jon Anderson	Team Losi Pro-SE
9	9	Steve Dunn	Team Losi Pro-SE
10	2	Scott Roberts	Associated RC10

Factory Truck Modified

Top Qualifier: Jeremy Kortz 13/4:10.39

Pos.	Qual.	Name	Truck
1	1	Jeremy Kortz	Team Losi LX-T
2	2	Brian Kinwald	Associated RC10T
3	10	Rick Vehlowl	Traxxas LS-II
4	4	Mike Dunn	Team Losi LX-T
5	7	Greg Hodapp	Associated RC10T
6	5	Bryan Peterson	Team Losi LX-T
7	6	Jon Anderson	Team Losi LX-T
8	9	Chris White	Traxxas LS-II
9	8	Jack Johnson	Team Losi LX-T
10	3	Scott Rister	Traxxas LS-II

2WD Expert Stock

Top Qualifier: Curtis Stock 12/4:02.70

Pos.	Qual.	Name	Car
1	2	Jeremy Kortz	Team Losi Pro-SE
2	5	Jay Robinette	Team Losi Pro-SE
3	3	Greg Hodapp	Associated RC10
4	1	Curtis Stock	Team Losi Pro-SE
5	9	Mike Fletcher	Team Losi Pro-SE
6	6	John Walentia	Team Losi Pro-SE
7	4	Carlos Gonzales	Associated RC10
8	10	Alex Chavez	Team Losi Pro-SE
9	7	Justin Eddleman	Team Losi Pro-SE
10	8	Brent Sarkison	Associated RC10

Truck Expert Stock

Top Qualifier: Jay Robinette 12/4:00.53

Pos.	Qual.	Name	Truck
1	1	Jay Robinette	Team Losi LX-T
2	3	Brendon Sarracino	Team Losi LX-T
3	4	Greg Torres	Team Losi LX-T
4	10	Michael Greer	Associated RC10T
5	9	Chuck Erickson	Traxxas LS-II
6	8	Roger Tibbets	Team Losi LX-T
7	7	David Wilson	Traxxas LS-II
8	2	Garret Sharbonow	Team Losi LX-T
9	6	Reese Dennis	Team Losi LX-T
10	5	Bob Russell	Associated RC10T

4WD Expert Modified

Top Qualifier: Brian Kinwald 13/4:09.81

Pos.	Qual.	Name	Car
1	1	Brian Kinwald	Yokomo
2	3	Brent Wallace	Schumacher
3	2	Jeff Wittman	Schumacher
4	8	Jack Johnson	Kyosho
5	6	Jack Ingberg	Schumacher
6	4	JD Beckwith	Dukomo
7	9	Aaron Biner	Dukomo
8	5	Mark Pavidis	Prototype
9	10	Vince Stolo	Dukomo
10	7	Jay Halsey	Schumacher

2WD Expert Modified

Top Qualifier: Curtis Stock 13/4:18.28

Pos.	Qual.	Name	Car
1	1	Curtis Stock	Team Losi Pro-SE
2	5	Brendon Sarracino	Team Losi Pro-SE
3	9	Jason Rudee	Associated RC10
4	8	John Walentia	Team Losi Pro-SE
5	3	Ethan Erchinger	Team Losi Pro-SE
6	2	Jay Robinette	Team Losi Pro-SE
7	4	Larry Plank	Plankton Chassis
8	7	Chris Raceles	Traxxas TRX-3
9	10	Brent Sarkison	Associated RC10
10	6	Mike Fletcher	Team Losi Pro-SE

Expert Truck Modified

Top Qualifier: Jay Robinette 13/4:13.42

Pos.	Qual.	Name	Car
1	2	Curtis Stock	Team Losi LX-T
2	3	Brendon Sarracino	Team Losi LX-T
3	7	Chris Raceles	Traxxas LS-II
4	1	Jay Robinette	Team Losi LX-T
5	4	Mike Weed	Team Losi LX-T
6	5	Jason Rudee	Associated RC10T
7	8	Aaron Biner	Associated RC10T
8	9	Mike Escamilla	Team Losi LX-T
9	10	John Walentia	Team Losi LX-T
10	6	Larry Plank	Associated RC10T

This year's NORRCA Nats was held at one of California's finest racing facilities: Bakersfield's own Racers Haven. The track was as challenging as they come, and its design resembled an MTGP track layout. The track's hard-packed surface made it easy to maintain, and the surface remained consistent throughout the three days of racing. It had many obstacles: three sets of single jumps, two back-to-back sets of doubles, a tabletop jump and the dreaded five-jump rhythm section. It has two stories; I called the upper deck the "view section."

Although the track was outdoors, it was originally built at a racing pavilion and has a ceiling to block the sun's evil rays. Two giant pit areas at each end of the track (one for the sportsman drivers and another for the expert and factory drivers) provided ample pit space for all the contestants. The track had a fully stocked hobby shop and an air-conditioned sandwich shop next door. There was also plenty of room for camping and enough parking to accommodate the large turnout of racers and spectators. It was the perfect racing environment.

SUNDAY, JUNE 28: DAY THREE— THE MAINS

Once again, by the time I checked in, the drivers were hard at work setting up their cars and trucks. This time, however, the atmosphere was far more serious than that of the first two days of qualifying, and you could feel the tension in the air. The drivers were weary from the intense heat and a lack of sleep, but they had the National Championship in their sights, and that was enough to keep them alert and focused. The spectators started arriving in herds, and by the time the "Presentation of the Flag" ceremony took place, it was standing room only. The spectators were going to be treated to some of the hottest off-road R/C racing on the West Coast, but little did they know they were about to witness one of the most amazing finishes in R/C history.

Jeremy Kortz dominated the Expert 2WD Stock A1 and A2 Mains and finished first in both; this gave him a perfect 200 points and the Expert 2WD Stock National Championship. Both Jay Robinette and Greg Hodapp ended up with



The Team Losi gang took first, second and third place in the Factory 2WD Modified Class and won the Factory Modified Truck Class in the hands of newcomer Jeremy Kortz. The team won the Sixth Annual Team Cup Challenge by a landslide.

198 points after the A3 Main, so the drivers' worst times were called in to break the tie. Jay's 12/4:12.58 was more than 12 seconds faster than Greg's 12/4:23.05, so Jay was declared the second-place winner, and Greg took third place.

In the Expert 2WD Modified Mains, Curtis Stock seemed to control the track; he finished with a perfect 200 points and secured the Expert 2WD Modified National Championship. Once again, it was a battle for the second- and third-place titles. Brendon Sarracino took the safe route and finished third in all three Mains for a total of 196 points and the second-place trophy.

Third place went to Jason Rudee, who had some bad luck in the first two Mains, but finished strong in the A3 Main.

In the Expert Stock Truck Mains, top qualifier Jay Robinette swept the first two A-Mains and earned 200 points and the Expert Stock Truck National Championship. Brendon Sarracino was close behind with 199 points and finished in second place. Greg Torres finished third with 198 points.

In the Expert Modified Truck Mains, it was a constant battle between Curtis Stock and Brendon Sarracino for the National Championship. After the A1 and A2 Mains, Brendon was ahead of Curtis by 1 point, but in the A3 Main, Curtis turned it on, literally swept Brendon under the table, and took the win and the National Championship. Brendon ended up second, and Chris Raceles finished third.

Once again, the Expert 4WD Modified Class kept the spectators on the edges of their seats. Top qualifier Brian Kinwald squeezed in front of Brent Wallace and won the A1 Main, Brent settled for second, and Jeff Whitman took third. (All three finished within 1 second of one another.)

In the A2 Main, Brian was muscled out of the



Throughout the race, the track was well-maintained and consistent. Notice the full ceiling overhead; this really helped to block the sun's evil rays.



Team Losi's "ace in the hole," Jeremy Korts, was very successful at the NORRCA Nats. He was top qualifier in the Factory 2WD Modified and the Factory Modified Truck Classes, and he won the National Championship in the Factory Modified Truck and the Expert 2WD Stock Classes.

grid and ended up fifth, and Brent—plagued by Murphy's Law—was sixth. J.D. Beckwith finished first, Jeff Wittman took second, and Jack Johnson was close behind for

third.

Going into the A3 Main, Jeff Wittman was ahead in points, but it was still anybody's ball game. After all the back and forth position swapping, it was Brent Wallace who came up with the win. Brian Kinwald placed second, and Jeff Wittman, third. After the points had been added, there was a tie between Brian and Brent for the National Championship, but Brian's fifth-place finish in the A2 Main was better than Brent's sixth place, so Brian emerged victorious. Brent took the second-place trophy, and Jeff Wittman (who was ahead in points going into the A3 Main) finished third.

The factory drivers competed in the Sixth Annual Team Cup Challenge. The points accumulated by each team in the Factory 2WD Modified and the Factory Modified Truck Classes would be combined, and the team with the most points would win the silver cup and the esteemed title of "Best Off-Road Team."

Team Losi swept the Factory 2WD Modified Class by placing first, second and third. Jack Johnson was the first-place winner with 199 points, and Bryan Peterson, who earned the same number of points, finished second. Scott Brown's 198 points earned him third.

In the Factory Modified Truck Mains, Brian

Kinwald won the A1 Main with a 13/4:10.05. Less than 2 seconds behind was Mike Dunn, who took second, and Greg Hodapp was third with a 13/4:18.84. Top qualifier Jeremy Korts just couldn't find a line and finished fifth.

In the A2 Main, Jeremy came back with a vengeance and finished in first place with the fastest time of the day—13 laps in 4 minutes, 9.86 seconds. Brian Kinwald, who was on Jeremy's tail throughout the race, took second with a 13/4:10.87. Third place went to Rick Vehlow with a 13/4:14.27.

The A3 Main was the last heat of the NORRCA Nats. Brian Kinwald was ahead in points, but Jeremy Korts was within striking distance for the Championship. The buzzer went off, and there was a back-and-forth battle between the two. During the last few seconds, the spectators were ecstatic. The trucks were neck and neck as they crossed the line. Jeremy and Brian were the only two drivers to cross the line before the buzzer, and they squeezed in the extra lap.

The race was over for all the other drivers, but it was still on between Brian and Jeremy. Neither would let up, and both trucks rubbed fenders the whole way. At the same moment, they hit the tabletop jump and became airborne. Brian's truck landed on top of

Jeremy's and both became wedged together. The front A-arm on Brian's truck interlocked with the rear A-arm of Jeremy's, and it sounded as if one of the trucks lost an axle roll pin and the tranny was spinning free without any forward move-

ment. Where were the turn marshals? No one attempted to separate the trucks, and consequently, they struggled across the finish line stuck together.

According to NORRCA rules, a car or truck must cross the line under its own power, and since one truck was pushing while the other was pulling, neither finished under its own power. The ruling to scratch the last lap came from NORRCA president J.R. Sitman, and the driver with the fastest previous lap time would be declared the winner. Although it seemed as if both trucks crossed the finish line at the same moment, the lap-counting system clocked Jeremy at 12/3:53.20—about a half second faster than Brian's 12/3:53.83 time. So Jeremy took first, Brian took second, and third place went to Rick Vehlow, who won by a tiebreaker.

There was a lot of heated arguing over J.R. Sitman's ruling. The National Championship was at stake, and it was only natural that the drivers wanted to voice their opinions. The ruling was final, though, and the 1993 NORRCA Off-Road Nationals made history. No doubt, this race will find its way to the "R/C Hall of Fame" for amazing finishes.

Team Losi earned 485 points and was declared the winner—by a landslide—of the Sixth Annual Team Cup Challenge. Associated finished second with 453 points, and Traxxas came in third with 367 points.



Kent Finney (left) and Lou Malbonado (right) worked many hours running the radio impound and measuring and weighing the cars and trucks. These guys get my vote for the best sense of humor at the event. I had to visit them frequently just to keep my sanity.



Curtis Stock was top qualifier in the Expert 2WD Stock and the Expert 2WD Modified Classes, and he won the National Championship in the Expert 2WD Modified and the Expert Modified Truck Classes. Way to go, Curtis!



Track owner Martin Buchanan (right) presents a trophy to Cliff Stock (center) and his son Curtis (left) for "hard work and dedication at the 1993 NORRCA Nats."

Hard work has its rewards

There's no doubt that organizing and preparing the NORRCA Nats required a lot of hard work and dedication. Some, however, put in more than their fair share, and they deserve recognition. Cliff Stock and his son Curtis took two weeks off from their jobs to prepare the track for the event. In appreciation for their hard work and dedication, they received a trophy.

All the hard work and dedication paid off for Curtis. He was top qualifier in the Expert 2WD Stock and Expert 2WD Modified Classes, and he won the Expert 2WD Modified and Expert Modified Truck National Championships. Congratulations, Cliff and Curtis!



"Best Paint" winner Bob Waters accepts his trophy.

PAINT PRODIGIES?

In Concours, Doug Voss walked off with top honors for his...wait for it...Interstate Batteries, NFL Properties, Shell, Goodyear Tires, STP Daytona 500 Winner, Chevy Lumina—*whew!*—which was driven by Dale Jarrett.

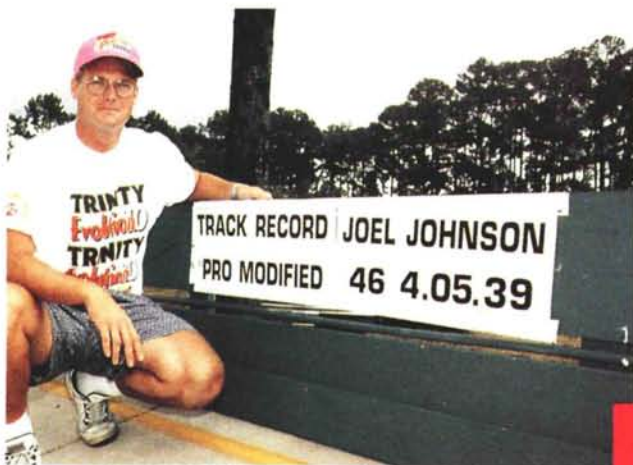
Showing a super scheme, Bob Waters of nearby Largo, FL, captured the top spot in Best Paint with his highly detailed Helig Meyers entry. (Helig Meyers is a furniture manufacturer in North Carolina.)

ROAR



Here's Doug Voss's replica of Dale Jarrett's Interstate Batteries Chevy Lumina.

Make one wrong move, and "kas-plooto!" The next thing you know, your car is road pizza.



Top qualifier Joel Johnson proudly stands next to the board that displays his fast time: 46 laps in 4.05:39—a new track record.

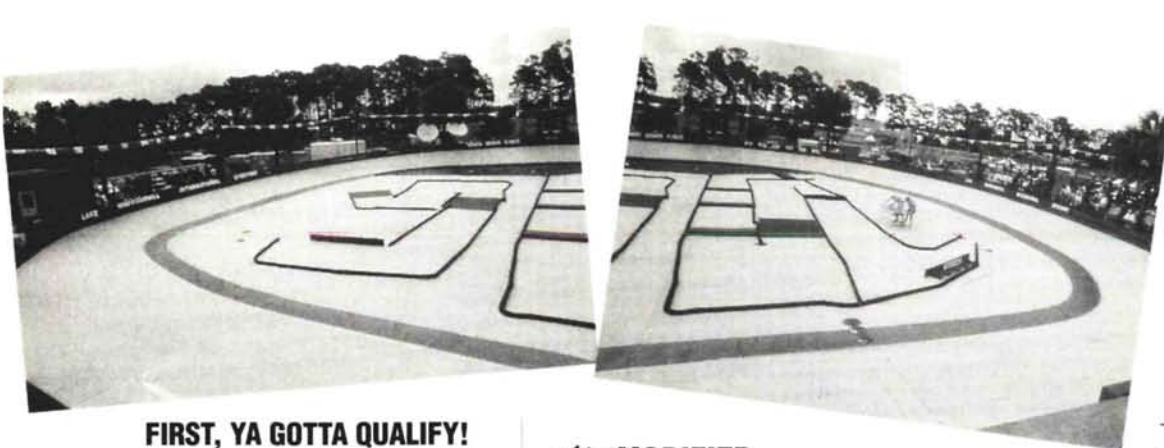
I WAS REALLY psyched when I was asked to cover this year's ROAR Paved-Oval National Championships at Lake Whippoorwill International Speedway in Florida. Held over the Memorial Day weekend, this event was the unofficial kick-off of the 1993 super-speedway scene.



CRACK THE WHIPP

by JIM SHEPKA

Paved Oval Nats



FIRST, YA GOTTA QUALIFY!

• 1/40 MODIFIED

Big surprise here (yeah, right!) "Magic Man," with his Evolution 10ss, continued to dominate the "Whipp" with qualifying times that just blew away the field. Both of his runs were just a tick shy of the unreachable 46-lap stratosphere. Other notables were Jeff Irish, Craig Carey and "Mr. Twister" Mike Boylan.

• 1/12 MODIFIED

This is my favorite class. The horsepower these guys generate is almost obscene—as is the close racing, competitive lap times and sheer, raw speed! Tony "Point Blank" Neisinger was top dog, because only two other drivers found their way into the 54-lap arena. Boylan and Johnson rounded out the top trio.

• 1/10 STOCK

This was by far the most popular class at this year's Nats: more than 80 LTOs powered by handout Speedworks powerplants carved up the concrete.

Perennial stockers Danny Shaw and Troy Desmarais were the only drivers to challenge the 42-lap barrier. There was a log jam on the rest of the field, with a ton of cars within nanoseconds of one another.

• 1/12 STOCK

It doesn't get any better than this: Ray Barker (49 laps: 5:01); local favorite Paul Schaub (49 laps: 5:02); and Troy "I can go faster" Desmarais (49 laps: 5:03)! I couldn't wait to see this one unfold.

PAVED-OVAL WINNERS

1/12 STOCK A-MAIN

Fin	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	2	Paul Schaub	12LW	Handout	Team Smooth	Tekin	N/A	Bolink	TRC
2	1	Raymond Barker	Jr. Assoc. 12L CC*	Handout	Voodoo	Tekin	Futaba	BBolink Pontiac	TRC
3	4	Larry Flowe	Assoc. 12L LTD/CC	Handout	PTI	Tekin	Futaba	Bolink T-Bird	TRC
4	8	Douglas Butz	TRC	Handout	Max Cell	Tekin 411G	Futaba	Bolink T-Bird	TRC
5	5	Robert Schoeneman	Assoc. 12LLTD	Handout	Team Smooth	Tekin	Futaba	Bolink Pontiac	TRC
6	10	Ray Johnson	Bolink	Handout	PCM	Tekin	Futaba	Bolink T-Bird	BSR
7	7	Phil Asseff	Hyperdrive RS	Handout	PTI	Tekin	Futaba	Protoform	TRC
8	3	Troy Desmarais	Assoc. 12L LTD CC	Handout	Team Smooth	Novak	Futaba	Bolink Pontiac	TRC
9	9	Ken Holmes	Assoc. 12L CC	Handout	Perfect Match	Tekin	Futaba	Bolink Lumina	Bolink
10	6	Earl Toltz	Assoc. 12L CC	Handout	New Wave	Novak	Futaba	Bolink Pontiac	TRC

1/12 MODIFIED A-MAIN

Fin	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	Joel Johnson	Trinity Revolver	Trinity	Trinity	Novak	N/A	Bolink Pontiac	TRC
2	Tony Neisinger	Trinity EV12SS	Revolver	Point Blank	Point Blank	Tekin	Bolink Pontiac	TRC
3	Shane Kocher	Trinity EV12SS	Revolver	Trinity	Trinity	Novak	Bolink Pontiac	TRC
4	Mike Blackstock	Trinity EV12SS	Revolver	Trinity	Trinity	Tekin	Bolink Pontiac	TRC
5	Justin Meridith	Assoc. 12LTO	Limo/	C. Craft Cam	Super Cell	Tekin	Parma Pontiac	TRC
6	Jim Dieter	Trinity EV12SS	Revolver	Trinity	Trinity	Novak	Bolink Pontiac	TRC
7	Bob Hall	Assoc. 12L/CC	Magnum	Perfect Match	Tekin	N/A	Bolink Pontiac	BSR
8	Jim Fuller	Assoc. 12LTO/CC	Trinity	Trinity	Novak	N/A	Bolink Pontiac	TRC
9	Dave Piehler	N/A	N/A	N/A	N/A	Sanyo	Bolink Pontiac	BSR
10	Mike Boylan	Assoc. 12 LTD	Limo Twister	Smooth	Novak	N/A	Bolink Pontiac	TRC

1/10 STOCK A-MAIN

Fin	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	3	Jason Alderman	Assoc. 10L/CC	Handout	Tom Crowe	Novak	Futaba	Protoform Pontiac	TRC
2	4	Ray Barker	Assoc. 10L SS/CC	Handout	Voodoo	Novak	Futaba	Protoform Pontiac	TRC
3	5	Shannon Moore	Assoc. 10L	Handout	GRP	Tekin	Futaba	Bolink Pontiac	TRC
4	8	Mike Dispenza	Assoc. 10L/CC	Handout	Voodoo	Tekin	Futaba	Protoform Pontiac	TRC
5	6	David Yahrays	Assoc. 10L	Handout	Team Smooth	Novak	Futaba	Protoform T-Bird	TRC
6	9	Spencer Sinsabaugh	Assoc. 10L/SS	Handout	Team Smooth	NNvak	Futaba	Protoform Pontiac	TRC
7	10	Billy Bruce	Assoc. 10L/CC	Handout	GRP	Novak	Futaba	Protoform Pontiac	TRC
8	7	Michael Wollard	Assoc. 10LSS/CC	Handout	Hagerstown Moped	Tekin	Futaba	Bolink T-Bird	TRC
9	2	Troy Desmarais	Assoc. 10LSS/CC	Handout	Team Smooth	Novak	Futaba	Protoform Pontiac	TRC
10	TQ	Danny Shaw	HPI	Handout	Voodoo	Novak	Futaba	Protoform Pontiac	TRC

1/10 MODIFIED A-MAIN

Fin	Qual	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	6	Chris Smith	Assoc. 10CSS/CC	East Coast Motors	New Wave	Novak	—	Bolink Pontiac	TRC
2	2	Jeff Irish	Assoc. 10LSS/CC	Lightspeed	Lightspeed	Novak	—	Protoform Pontiac	TRC
3	5	Mike Boylan	Assoc. 10LSS/CC	Twister	Team Smooth	Novak	—	Protoform Pontiac	TRC
4	7	Tony Neisinger	Trinity EV10SS	Point Blank	Point Blank	Tekin	—	Bolink Pontiac	TRC
5	10	Troy Meridith	Assoc. 10LSS/CC	Cam	Super Cell	Tekin	—	Bolink Pontiac	TRC
6	4	Shane Kocher	Trinity Evolution SS	Trinity	Trinity	Novak	—	Bolink Pontiac	TRC
7	9	Kent Clausen	Hyperdrive 10RS	Cam Pro	Reedy	Novak	—	Assoc. Pontiac	TRC
8	TQ	Joel Johnson	Evolution SS EV10	Trinity	Trinity	Novak	—	Bolink Pontiac	TRC
9	8	Jim Dieter	Evolution EV10SS	Trinity	Trinity	Novak	—	Bolink Pontiac	TRC
10	3	Craig Carey	Hyperdrive 10RS	Cam Pro	PTI	Tekin	—	Protoform Pontiac	TRC

*CC=Composite Craft

Mighty, magnificent mains!

1/12 A-MAIN STOCK

From the outside of the second row, Larry Flowe made a holeshot and jumped out to an early lead. Pole sitter Ray Barker and runner-up Paul Schaub tucked in behind him as they freight-trained it for the first couple of minutes.

Little separated the top three until Flowe got a brain cramp and short-tracked it coming out of lap four. Cutting a turn meant a slow-and-go penalty.

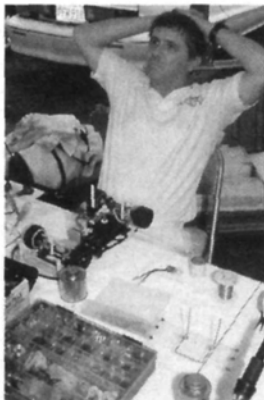
This allowed Schoeneman into third spot, until a slow-and-go penalty nailed him, too. Meanwhile, Barker and Schaub stretched their lead as they worked to put some distance between themselves and the rest of the field.

At the 4-minute mark, Schaub started to wear Barker down, and going into turn one, he went by for the lead. Meanwhile, back in the pack, Schoeneman and Flowe were hard at it for the third spot.

At the buzzer, Schaub held off Barker for the win and was followed by Flowe.

1/12 A-MAIN MODIFIED

The start of this one was really ugly! I think one of the cars had been wired in reverse, and two others failed to fire on the line. It was hard to tell, but in the final tally, seven was the lucky number. To make matters worse, one of the drivers (who will remain nameless for this rookie mistake!), turned off his radio before a turn marshal could get to his car and shut it down. Running wild like ferrets at a rabbit jamboree, Tony "TQ" Neisinger and the rest of the field somehow managed to avoid the chaos



Bob Novak kicks back as he prepares his car for a race. The inside word is that Novak is working on some really hi-zoot projects. You'll know as soon as we do!

until a corner marshal could finally put the ailing car out of its misery.

Meanwhile, Neisinger, "Magic" Johnson and Jim "the Revolver" Dieter were in the front, while favorites such as Mike Boylan, Dave Piehler and Jim Fuller had been sidelined at the start.

The big three were still out in front, with "Magic" drafting off Neisinger's rear spoiler. At the 2-minute mark, Johnson decided that he had had enough of second place, so he blasted past Neisinger on the front straight. Dieter was tucked in behind Neisinger, but he didn't look like a real threat.

At about the 3-minute mark, as Neisinger went a little high on the track, Dieter found a enough ponies to pass. At the 4-minute mark, "Magic" was still out front, followed (not too closely) by Dieter and Neisinger. A few circuits later, Neisinger started to go soft, and Shane Kocher, who was driving at a steady pace, passed him for the third spot. Dieter's batteries went south at just about the same time, and that allowed Justin Meridith a shot at the leader.

Johnson was too far out in front to be seriously threatened. His Trinity Revolver shot across the finish line for its first national championship win. At the buzzer, Neisinger held off Kocher for the runner-up spot.

1/10 A-MAIN STOCK

This was probably the best race of the weekend, because from the first minute, the top qualifiers held true to form. Danny Shaw led for seven laps, while Troy Desmarais and Jason Alderman ran bumper to bumper. When leader Shaw got off line going into turn four, he took Desmarais along for the ride. As they tried to regain control, Alderman said "See ya!" and Desmarais and Shaw were collected by the rest of the field. Battery packs and body posts were everywhere, and they sent Shaw and Desmarais behind the wall.

Alderman (any relation to drag-racer Daryl?) was still in the lead with Ray Barker and Shannon Moore in pursuit.

Mike Dispenza tried to make a run for third, but he didn't have the draft and fell back in line.

In the end, they finished the way they had qualified: Jason Alderman, Barker, Moore, Dispenza and David Yahraus.

1/10 A-MAIN MODIFIED

TQ "Magic" Johnson was shooting for two in a row with a new track record—46 laps—in an unbelievable 4:05.39! The only driver to go 46 (not once, but twice!) during the entire weekend, he was the odds-on favorite.

After a great holeshot at the start, going into the tri-oval on lap two, Johnson still held the advantage.



Chris Smith (second from left) accepts his first-place trophy for the 1/10-scale Modified A-Main.

Unfortunately, a brain-dead corner marshal put down a spinning back marker (Craig Carey's Hyperdrive car) directly in front of the lead pack! *Kapow!* To get some idea of the impact of this crash, look at what was left of Carey's car! Not only did Johnson hit him dead...solid...perfect, but Jim Dieter also managed to catch him on the rebound, just to make sure nothing



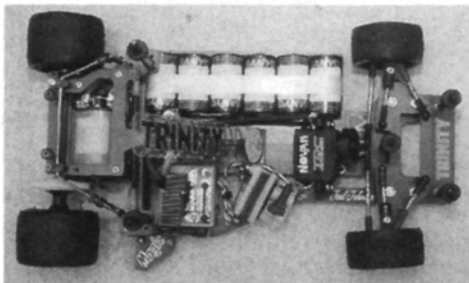
Waffled! Here's what was left of Craig Carey's Hyperdrive car after Joel Johnson hit it at full speed in the 1/10-scale Modified A-Main.

was left intact. A third of the field went up in a ball of fire. (The corner marshal—who shall remain nameless!—was last seen being escorted toward the lake wearing concrete shoes!)

Back on track, Boylan took control while Chris Smith and Jeff Irish mixed it up behind him. Kent Clausen—driving for Cam and Hyperdrive—cut a tire running over debris so he pulled his car behind the wall. And then there were six!

Boylan still held the point, but everyone was dicing for position. Tony Neisinger, Troy Meridith and Shane Kocher still had a shot at the leaders. With 30 seconds left, Boylan went soft, and that put Chris Smith and Jeff Irish out in front. Kocher made a desperate run at the leaders, but he faded quickly as the buzzer sounded, and Smith held off Irish for the national crown. Boylan held on for third, and he was followed by Neisinger, Meridith and Kocher.

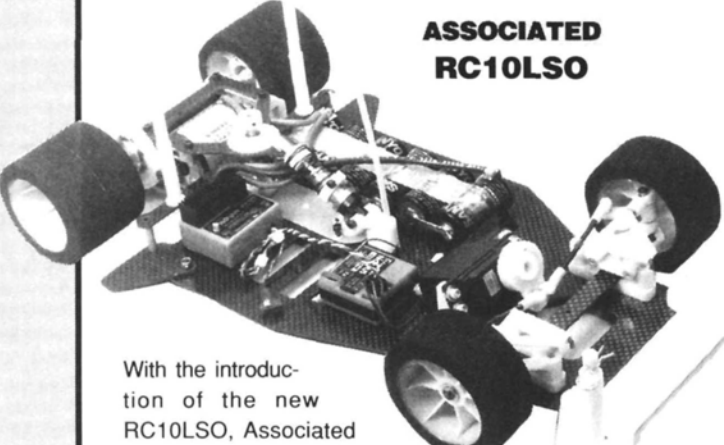
Congratulations to all the racers and to everyone at the "Whip" for their first-rate organization. Bob and Yvonne Hosch and their mighty crew have one of the best facilities in the sport. Special kudos also goes to Bolink R/C Cars for their support of this year's Nats. ■



One of the new items at the track was Trinity's all-new Revolver 12. Joel Johnson drove the car to its first national oval title.

Speed Shop

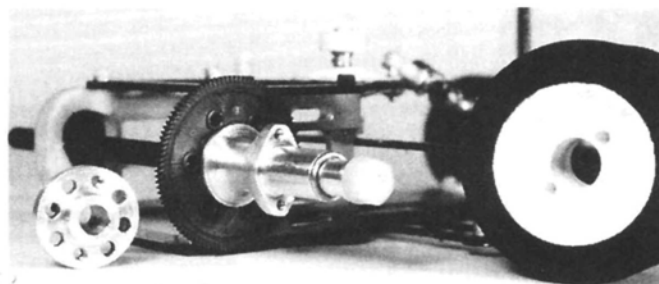
ASSOCIATED RC10LSO



With the introduction of the new RC10LSO, Associated has improved the super-speed-way oval car. The RC10LSO includes Associated's new Dynamic Strut front suspension, which gives you the ability to change caster, camber and spring rates quickly and easily so that you can fine-tune your car faster than ever before. Also included is Associated's new, improved shock with a new Teflon shock piston and Teflon assembly parts. The RC10LSO is easy to assemble. It's a complete rolling chassis with bearings; the body, motor, batteries and electrics aren't included.

Part no.—8012; **price**—\$250.

Associated Electronics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342.

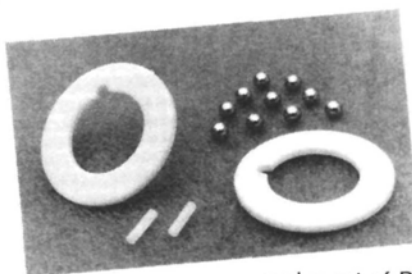


TM RACING COMPONENTS Phase II 1/12-scale Wheels and Hubs

TM's new Phase II 1/12-scale rear wheel and hub system allows you to change your car's rear wheels without having to take the differential apart. Just slip the new Phase II wheels over the new hub, and hold them in place with two 4-40 screws. Your diff's action will be more consistent because all the bearings are mounted in the aluminum hub. These wheels and hubs are available at hobby shops everywhere.

Part nos.—4026 (green-dot foam tires), 2470 (hubs); **prices**—\$10, \$28.95.

TM R/C Racing Components, 49679 Leona Dr., Chesterfield, MI 48051; (313) 949-3506.



BRP Ceramic Differential Drive Ring Kit

These high-tech, super-precision diff rings are notched for pinning.

They come with pins

and a set of BRP's differential balls. Many

top racers have used this setup for months of racing!

Part no.—2115; **price**—\$24.95.

BRP, 1575 Lowell St., Elyria, OH 44035; (216) 284-0270.



HORIZON Dynamite Power Packs

Each Power Pack contains five Sanyo 600mAh AE cells, which provide more than enough power even for 1-hour gas races. Configured in a flat pack or a hump pack for easy installation in any gas car or truck, each is wired and shrink-wrapped for total convenience. Each Power Pack also comes with a universal connector that will work with JR and Futaba radios as is, and with Airtronics and KO systems after a simple polarity adjustment.

Part nos.—DYN1410 (5-cell flat pack), DYN1411 (5-cell hump pack); **price**—\$27.95.

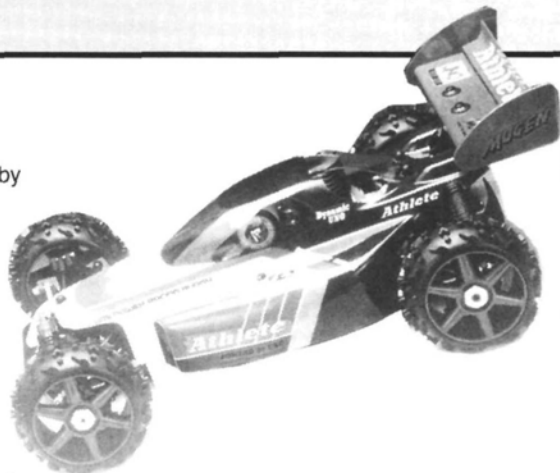
Dynamite; distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

MUGEN Athlete

The Athlete is Mugen's new 1/8-scale, 4WD, off-road racing buggy. Designed by Kohji Sanada ('90 to '92 IFMAR World Champion), it has small, light differentials; twin in-line center-line drive shafts; hardened-steel gears; a wide, adjustable wishbone suspension; dual brakes; a 4mm Duraluminum™ chassis; anodized-aluminum shocks; and a new radio tray with a waterproof, dustproof receiver box. Also included are an exhaust header, a flywheel, a clutch bell and an engine nut for SG/Serpent-style crankshafts. Its uncomplicated design makes it easy to set up and maintain.

Part no.—1005; **price**—\$649.99.

Mugen USA, 910-D Brandy Creek Dr., Mechanicsville, VA 23111; (804) 730-0008.



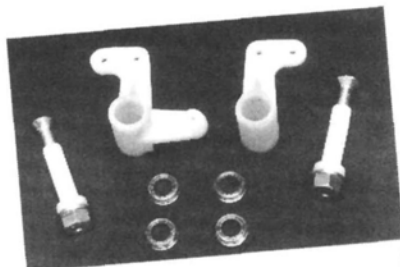
RPM RC10T Ball-Bearing Bellcrank

This is the precision ball-raced bellcrank that's included with RPM's molded RC10T Chassis Kit. Its geometry is the same as that of a stock RC10T, and it can be mounted securely in the threaded holes of your aluminum chassis. With the

aid of a thin locknut on the top side of the chassis, it can also be used on a graphite chassis. It comes with four 1/4x3/8-inch, flanged bearings, aluminum mounting screws and nylon top nuts.

Part no.—8012; **price**—\$24.95.

RPM, 14978 Sierra Bonita Ln., Chino, CA 91710; (714) 393-0366.



TD ENTERPRISES The Protector

Get the original—now at a reduced price! This innovative product provides the best high-speed crash protection available for R/C cars. It can be trimmed to fit any body/chassis combination. The front body posts run through The Protector and prevent lateral movement; the rear stem butts up against the front suspension blocks so The Protector can't move rearward; and, if you trim the front of The Protector so that it closely matches the front profile and contour of the body, it will prevent the body from becoming inverted or bent (and cracked!) during impact.

Price—\$6.95.

TD Enterprises, P.O. Box 3301, Lexington, OH 44904; (800) 253-7229.



RACER'S CHOICE BMT 931

This new 1/10-scale, 2WD on-road gas car has the same performance features as those of its world-renowned BMT 891: a two-speed transmission; 4W independent suspension; inboard disk brakes; adjustable camber, caster, toe-in/out and ride height; and precision ball bearings throughout. Its parts are also interchangeable with those on the 1/8-scale version. If you want to enjoy the realism and excitement of gas-car on-road or oval racing, try the 931!

Part no.—BMT 931; **prices**—\$499.95 (with solid axle), \$549.95 (with adjustable ball diff).

Racer's Choice R/C Products Inc., 6N258 Acacia Ln., P.O. Box 405, Medinah, IL 60157; (708) 980-4863.



MRC Sanyo Battery Pack

If you want the best performance from the Thunder King, Desert Thunder or Baja King on-road racers, you need a premium-quality battery pack. MRC and Sanyo have teamed up to make such a pack. The cells in these 8.4V,

1700mAh, SCR flat packs are factory-matched and welded together (not soldered); the packs are shrink-wrap-covered; and a plastic endcap is added. An industry-standard connector is attached.

Part no.—RB452; **price**—see your hobby dealer.

MRC, 200 Carter Dr., Edison, NJ 08817; (908) 248-0400.

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Berry R/C Raceway, Main St. Berry, AL 35543, Ronny Don (205) 932-3189



CJ's Hobbies, 3761 Government Blvd. Mobile, AL 36693, C.J. (205) 666-0016



Dixie R/C Speedway, Rt. 10, Box 210, Gadsden, AL 35901, Craig Reynolds, (205) 442-1059



Fleming's R/C Raceway, 169 Raceway Dr., Wellington, AL 36279, Phil Fleming (205) 820-6269



Oak Mountain Raceway & R/C Club, 2624 Janice Circle, Birmingham, AL 35235, Will Barrett, (205) 856-7051



Performance R/C Hobby, 2600 A Bellline Rd., Decatur, AL 35603, Ray & Debra Steen, (205) 353-3399



Phoenix Raceway, 2006 Opelika Rd., Phenix City, AL 36867, Casey Hoover, (205) 297-0040



Piedmont R/C Superspeedway, 41 Jewel Lane, Oxford, AL 36203, Terry Young or Greg Games, (205) 831-2986 or 831-1666



R/C Hi-Tech Raceway, 3303 Meridian St., Huntsville, AL 35811, Rick Chambers, (205) 539-1347



Satellite Hobbies, 2799 Rose Rd., A. Herbertville, AL 35950, Troy or Jerry Smith, (205) 878-2528



Spring Cove Speedway, Rt. 1, Box 95, Fairhope, AL 36530, Chuck or Lyda Syddall, (205) 757-5898



ALASKA

ARCORR, 2612 Spenard Rd., Anchorage, AK 99503, Jim Raffuse, (907) 277-7778



McKinley Hobby & Raceway, 2300 McKinley Dr., Wasilla, AK 99654, (907) 376-9351



Seth's Speedways, 3400 Hiland Dr., Anchorage, AK 99504, Seth Graham, (907) 337-3777



Southtown Hobby & Raceway, 12001 Industry Way, #2, Anchorage, AK 99515, Bob or Vickie Peters, (907) 345-3131



Slump Hobby & Track, 13651 Jarrui, Anchorage, AK 99504, Don Slump, (907) 345-8476



ARIZONA

Economy One-Stop Raceway, 4000 S. 4 Ave., Yuma, AZ 85366, (602) 344-3514



Finish Line Raceway, 7025 E. 21st St., Mesa, AZ 85710, Jerry Kinnert, (602) 747-3633



G&S Raceway, 967 Hancock, Bullhead City, AZ 86442, Bob Olsen, (602) 758-1100



Havasut R/C Raceway, 1081 Desert View Dr., Lake Havasu City, AZ 86403, Bernie Coates, (602) 680-6304



HobbyTown Raceway, 9180 E. Indian Bend Rd., Scottsdale, AZ 85250, Dennis, (602) 948-3946



HobbyTown Raceway, 1915 East Baseline Rd., Gilbert, AZ 95234, Kenny, (602) 892-0405



HobbyTown Speedway, 2814 W. Bell Rd., Phoenix, AZ 85023, Mike Kaminski, (602) 993-0122



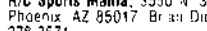
Outlaw Raceway, 5309 Lakewood Rd., Ft. Mohave, AZ 86427, Frank Greely, (602) 768-5001



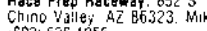
R/C Raceplex, 5222 W. Glendale Ave., Glendale, AZ 85301, Bill Murray, (602) 934-5567



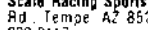
R/C Sports Mania, 3550 N. 35th Ave., Phoenix, AZ 85017, Brian Dick, (602) 278-3671



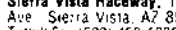
Race Prep Raceway, 852 S. Hwy. 89, Chino Valley, AZ 86323, Mike Dunn, (602) 636-1955



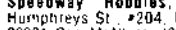
Scale Racing Sports, 1120 N. Hayden Rd., Tempe, AZ 85281, Mike, (602) 829-9177



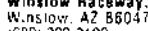
Sierra Vista Raceway, 105 N. Central Ave., Sierra Vista, AZ 86535, Wayne Tumlin Sr., (602) 459-1335



Speedway Hobbies, 1000 N. Humphreys St., #204, Flagstaff, AZ 86001, Gary McAllister, (602) 556-0710



Winslow Raceway, 813 E. 3rd St., Winslow, AZ 86047, Shawn Wilkie, (602) 289-2192



ARKANSAS

Arkansas Int'l. Superspeedway, P.O. Box 1636, Pine Bluff, AR 71613, Joe Pitts, (501) 247-2371



OCA Racing, 412 Hiway & 14th St., Paragould, AR 72450, Lytle Spillman, (501) 236-9706



Performance Hobbies, 2222 Spence, Jonesboro, AR 72401, (Rick) Winingham, (501) 935-6501



CALIFORNIA

Appletree Raceway, 1303 Hermosa Ave., Pacifica, CA 94044, Sonny Day, (415) 359-9755



ARO Hobbies Raceway, 24275 Sunnyvale, Moreno Valley, CA 92553, George or Mike Kileen, (714) 924-3240



Art & Dean Raceway, 29409 Maguest, Lake Elsinore, CA 92530, Art, (714) 245-0920



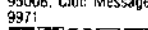
Bob & Jim's R/C World, 3485 University Ave., Riverside, CA 92501, Bob Parcell, (714) 684-6374



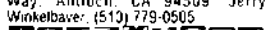
Brake-a-Way Raceway, 3719 Hamner Ave., Norco, CA 91750, Debbie Burrie, (714) 736-8063



California Auto Racers (CAR), 96 San Tomas Aquino Rd., Campbell, CA 95008, Club Message Line, (415) 568-9971



Cats West Raceway, 5631 Old Lone Tree Way, Antioch, CA 94509, Jerry Winkelbaver, (510) 779-0505



City Speedway, 7750 Convey Ct., San Diego, CA 92111, (619) 560-9633



Cloverdale R/C Raceway, 1 Citrus Fair Dr., Cloverdale, CA 95425, Tom Kelley, (707) 586-9789



Covina Racing Company, 1611 W. San Bernardino Rd., Covina, CA 91722, Tom, (818) 331-4984



Cycle Art Raceway, 2211 N. Pleasant Way, Fresno, CA 93705, Richard De Benedicts, (209) 233-3665



D&D Raceway, 290 S. First St., Turlock, CA 95360, Dave Miller, (209) 667-0970



Desert R/C Raceway, 9231 E. Hobson Way, Blythe, CA 92225, Rodney Lazenby, (619) 922-5516



Drag City, 1361 W. Valley Blvd., Colton, CA 92324, Chris Gabriel, (714) 370-0580



Fast Eddie's R/C Raceway, 3261 Edward Ave., Santa Clara, CA 95054, Eddie Atlaque, (408) 986-8256



Fast Lane, 25845 San Fernando Rd., #2, Saugus, CA 91350, (805) 255-2404



The Finest R/C Off-Road Circuit, 8711 Elder Creek Rd., Sacramento, CA 95820, Jason, (916) 381-6555



FrogTown R/C Raceway, Motherlode Hobbies, 3069 Hwy. 49, Angels Camp, CA 95222, (209) 736-4989



Gina's R/C Palace, 1839 Olympus Loop Dr., Vista, CA 92083, Gina Garner, (619) 598-8069



G.L.A.R.C.R.C., Whittier Narrows Park, Rosemead, CA 91770, Jon D. Angiolillo, (310) 944-0870



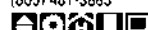
Greater Los Angeles R/C Racing Club, California State University, Parking Lot A, Los Angeles, CA 90045, Glenn Williams, (213) 734-7888 or Tom Wong, (310) 821-5472



Hayes Raceway, 628 Walnut Ave., Patterson, CA 95363, Andy Hayes, (204) 892-5080



Hobbycrafters, 1319 Pacific Blvd., Oceano, CA 93445, Craig or Damian, (805) 481-3883



Hobbycrafters Raceway, 323 Five Cities Dr., Pismo Beach, CA 93449, (805) 773-6765



Hobby Haven Raceway, 3983 First St., Livermore, CA 94550, Tom Welding Jr., (510) 443-5828



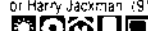
Hobbytown Raceway, 1330 Keystone Way, Vista, CA 92083, Bryan Bahlmann, (599) 0456



Hobby Warehouse, 5500 So. Watt, Sacramento, CA 95828, Roger Hubbard, (916) 381-7587



Jackman's R/C Raceway, 1616 N. Beave Rd., Marysville, CA 95901, Bonnie or Harry Jackman, (916) 741-3744



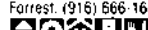
JD Hobbies, 1009 W. College Ave., Santa Rosa, CA 95401, Mike, (707) 571-1700



K&M R/C Raceway, 22474 A. Barton Rd., Grand Terrace, CA 92324, Mike Blake, (714) 783-0899



The Land of R/C, 2717 Gerber Road, Suite 8, Woodland, CA 95695, Le Forrest, (916) 666-1699



Lindsey's R/C Raceway, P.O. Box 443, Doyle, CA 96109, (916) 827-2457



Lucerne Valley Raceway, 32800 #4 Old Woman Springs, Lucerne Valley, CA 92356, Frank Rodriguez, (619) 248-7305



M.B. Raceway, 1031 Fremont, Alhambra, CA 91801, Tony or Dave, (818) 284-4198



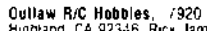
Merced R/C Auto Racers (MRCAR), 1652 W. North Bear Creek Dr., Merced, CA 95348, Ed Loper, (209) 725-8040



MnM Hobbies, 137 N. Vander, Corona, CA 92720, Don Hughes, (909) 277-3545



One-Stop Raceway, 3782 Cerritos Ave., Los Alamitos, CA 90723, (213) 493-7597



Outlaw R/C Hobbies, 7920 Webster, Highland, CA 92346, Rick James, (909) 864-1770



Paso Robles R/C, P.O. Box 3795, (3980) Linne Rd., Paso Robles, CA 93447, (805) 237-0624



Pegasus Raceway, 14643 Hawthorne Ave., Fontana, CA 92336, Ern Dog, Bob Cat, (909) 822-0226



Parris Recreation R/C Track, 120 N. Parris Blvd., Parris, CA 92370, Ler or Fay Shirley, (714) 943-6603 or 657-4879



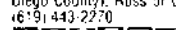
R/C Off-Road Raceway, 10810 Talbert Ave., Fountain Valley, CA 92708, Jeff Paul or Bob Pege, (714) 965-9615



R/C Speedway and Hobbys, 1453 North Milpitas Blvd., Milpitas, CA 95035, Mike Meial, (408) 263-4228



R/C Racing Center and Hobbies, 9842 Channel Rd., Lakeside, CA 92040 (San Diego County), Russ or Cindy Escalera, (619) 443-2270



R/C Sports, 759 E. Monte Vista Ave., Vacaville, CA 95688, (707) 446-5555



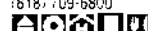
R/C World, 5759 E. Fountain Way, Fresno, CA 93727, Brian Gaynor, (209) 348-9409



The Race Place, 13564 F. Imperial Hwy., Joliet, G. Santa Fe Springs, CA 90670, (213) 926-7711



Race Prep Raceway, 20115 Nordhoff, Chatsworth, CA 91311, Steve Dunn, (818) 709-6800



Racer's Haven Hobby, 7401 White Ln., #9, Bakersfield, CA 93389, Martin Buchanan, (805) 835-0447



Radio-Controlled Hobbies, 2511 Placenta Ave., Costa Mesa, CA 92626, (714) 631-1555



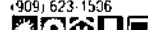
Radiowave Hobbies, 4572 Telephone Rd., Ventura, CA 93003, A. Young, (805) 642-0390



RAMS, Murco Plaza, Paseo Padre Pkwy. & Mowry, East Fremont, CA, Mike Aiton, (510) 490-8734



Ranch Pit Shop, 1655 E. Mission Blvd., Pomona, CA 91766, Billy Bowlerman, (909) 623-1506



RCRC Hobbies, 2069 Pacific Coast Hwy., Upland, CA 90017, Rhea & Cliff Fisher, (910) 536-7272



Rick's R/C Speedway, 217 3rd St., Eureka, CA 95501, Rick Hynard, (707) 445-3341



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Roy's Raceway, 368 E. 11th St., Ely, CA 95516, (209) 856-3513

RP Hobbies, 6650 Commerce Blvd., 21 Richmond Park, CA 94948, (415) 566-3355

Sacramento Mini-Wheels Raceway, 8711 Elder Creek Rd., Sacramento, CA 95828, (916) 383-4011

San Diego R/C Car Club, P.O. Box 232456, San Diego, CA 92193, (619) 566-0089

Scott's Practice Track, 1131 Ramona Dr., Mt. Shasta, CA 96067, Scott Cleveland, (816) 926-1212

So. Cal R/C Raceway, 11430 Valley View St., Garden Grove, CA 92645, Jim Blauvelt, (714) 892-0088

Square Roundhouse R/C Speedway, 1468 Lander Ave., Torrance, CA 90580, (209) 668-4454

SRS Raceway, 915 N. Main St., Salinas, CA 95906, (408) 424-4044

Tanforan Action Track, Tanforan Shopping Center, San Bruno, CA 94066, Jerry Lindgren, (415) 583-2683

Team Air Racing Club, 16208 Arpenia Hwy., Yorba Linda, CA 92666, Don C. Nick, (714) 519-1486

Tyler's RC/RD Racing Center, 6865 Flinders, #D, San Diego, CA 92121, (619) 597-3072

Valley R/C Race Park, 146 S. Santa Fe St., Hemet, CA 92344, Valerie Wide, Registration: (714) 654-1505 or 658-4322

Ventura Road Runners/Freedom Park Raceway, 520, Freedom Park, Guimaraes, CA 93010, Les Abgeson, (805) 384-2920 or 1-800-889-8266

Victory Speedway, 22960 Victory Blvd., Woodland Hills, CA 91367, Rob Samuels, (818) 888-9000

White Mountain R/C Raceway, 174 West Line, Bishop, CA 93514, (619) 872-1599

Zero n 4 Hobbies, 3390 S. Farway, Visalia, CA 93277, Eddie McKay, (209) 733-1846

Colorado R/C Speedway, 6520 Wadsworth Blvd., #130, Arcadia, CO 80003, (303) 425-1718

J.P.'s Raceway, P.O. Box 933, Ignacio, CO 81137, Jim A. Paul, (303) 563-0025

MHOR R/C Raceway, 15540 E. Batavia Dr., Aurora, CO 80011, Jims Brockman, (303) 743-0151

Miracle R/C Speedway, 4206 Wadsworth Blvd., Wheatridge, CO 80034, Rob Blossman, (303) 422-2051

Brantford R/C Speedway, Rt. 3, Box 240, Brantford, FL 32033, (904) 935-0758

Broward County R/C Race Club, 2201 NW 9th Ave., Mills Pond Park, Ft. Lauderdale, FL 33314, Ed, (305) 480-9374 or John, (305) 925-8284

Challenger Speedway at the Willows, Willows Park & Okaloosa, Blythe, Royal Palm Beach, FL 33414, Walt, (407) 965-2790 or Mark, (407) 790-6917

Coral Springs Roadrunners, P.O. Box 9637, Coral Springs, FL 33075, Tom Allison, (305) 721-0344 or Rick Schwartz, (305) 344-1983

Dog's Indoor R/C Raceway, 16803 US 19N, Clearwater, FL 34624, Steve Dec, Wachs, (813) 824-7702

5-fifty-5 Raceway, 125 Second Terrace, West Winter Haven, FL 33880, Chuck Nake, (813) 524-7406

First Coast International Speedway, P.O. Box 1342, Jacksonville, FL 32201, (342) Bob Thompson, (904) 743-2161

FYRE, 14160 Hwy. 441, River Plant, Lakes, FL 32728, Ray Salerno, (904) 357-1635

Gainesville R/C Speedway, 9311 SW 25 Way, Gainesville, FL 32608, Greg Rhodes, (904) 495-3600

Greater Orlando Auto Racers, 970 Keller Rd., Altamonte Springs, FL 32714, Dave Martin, (407) 293-7090

H&H Raceway, 4121 S. Tamiami Tr., Sarasota, FL 34231, (813) 922-7711

Hialeah Hobby Speedway, 4562 W. 12 Ave., Hialeah, FL 33015, (305) 826-3702

Hobby Shop Speedway, 1805 Hwy. 32, Panama City, FL 32404, Larry Polock, (904) 763-4599

JARCAR Raceway, 7273 103rd St., Jacksonville, FL, Rob Kense, (904) 272-6315

Kenny's Track & Hobby, 11125 US 41, South Gibsonton, FL 33534, Kenny Rias, (813) 671-9123

Lake Whipperwill International Speedway, 2345 Narcoossee Rd., Duluth, FL 32827, Bob Hosch, (407) 277-9586, fax: (407) 277-2568

Louie Burton's R/C Raceway, 4215 Mustang Rd., Lakeland, FL 33803, Louie Burton, (813) 665-1322

M&M R/C Raceway, 16921 Waterline Rd., Bradenton, FL 34202, Mike Williams, (813) 747-2889

Miami R/C Speedway, 12546 N. Kendall Dr., Miami, FL 33186, Jeff Mayorga or Pat Butler, (305) 271-3101

Miami Speedway, 7305 NW 148th St., Miami Lakes, FL 33014, Julio Romero, (305) 687-6728

Ocala R/C Car Club, P.O. Box 70166, Ocala, FL 32670, Larry F. Mitchell, (904) 245-2699, Steve Smock, (904) 694-5117

Oceanside Raceway, 206 L. Eads Gate Blvd., Indian Harbour Beach, FL 32937, Michael Kelly, (407) 242-0454

Paul's R/C Track & Hobby, 4511 Dr. M.L. King Blvd., Suite 8, Tampa, FL 33614, Paul, or Lisa Simmette, (813) 879-8662

PBG R/C Motor Park, 6351 Bulbari St., Palm Beach Gardens, FL 33410, Doug Genson, (407) 743-9791

Performance Plus Raceway, 2820 SE 62 St., Ocala, FL 34481, Charlie Floyd or Cam Rios, (904) 867-5557

Pro Hobbies Speedway, 715 N. Lake Pleasant Rd., Apollo, FL 32712, (407) 886-1615

R/C Action, 646 Clay, Lee City, FL 32708, (407) 695-6746

Ray's Track & Hobby, 4005 W. Cayuga St., Tampa, FL 33614, (813) 872-8662

Rental Raceway, 3655 S. Hupkins Ave., Tequesta, FL 32980, (407) 383-0631

River City R/C Car Club, 9711 Shoring Cross Dr., Jacksonville, FL 32257, Bill Fradette, (904) 768-1418

Southern Hobbies, 10 N. Macarider Ave., Orlando, FL 32805, Mike Spehr, (407) 521-7479

Southwest Florida R/C Raceway, 7476 Rivers Rd., Naples, FL 33964, Clyde Armstrong, (813) 455-1143

Sun Valley Speedway, Palmer Blvd., Sarasota, FL 34232, (813) 322-7200, mailing address: Rt. 1, Box 4430, Meakka, FL 34251

Three Flags R/C Raceway, Rt. 2, Box 48 A, Wildwood, FL 34785, Don Muires, (804) 748-3510

TJ's R/C Raceway & Hobby Shop, 1010 Gresham Rd., Pensacola, FL 32504, John August, (904) 429-2330

Treasure Coast R/C Club, 4931 Osander, Fort Pierce, FL 34962, Lou, (407) 464-3207

West Coast R/C Club, Lake Park, 17203 N. Dale Marr, Tampa, FL 33549, Jim, (813) 932-3650, Bob, (813) 239-9630

Wilbur Avenue Raceway, 1848 Wilbur Ave., Vero Beach, FL 32960, (407) 567-1202

Dallin Raceway, 2300 Chattanooga Rd., Dalton, GA 30726, (404) 276-6699

Georgia Hobby Center, 110 Kennesaw Rd., Fayetteville, GA 30214, (404) 460-1753

Good Life City Raceway, 6606 Newton Rd., Albany, GA 31707, (417) 888-2515

Lake Mayer Raceway, 1 Melinda, Savannah, GA 31460, Phil Hunt, (912) 355-6033

Middle GA Sior Car, 1805A Watson Blvd., Warner Robins, GA 31088, Larry Tucker, (612) 922-RAC3

PDC Raceway & Hobbies, 541 Serrna Rd., Peachtree City, GA 30269, Richard Bulder, (404) 651-7866

The Racer's Edge, 1530 Hwy. 19 N., Marietta, GA 30066, Roger or Mark Walls, (706) 648-2637, (706) 648-6534

Sandy Cross Speedway, Rt. 1, Box 1073, Hayslett, GA 30662, Morris Phillips or Wayne Everett, (404) 245-9573

Silver Wings Raceway, 5611 Riverdale Rd., College Park, GA 30349, (404) 991-2225

Sugar Bowl R/C Speedway, 5272 North Ave., Sugar Hill, GA 30076, Shelley or Jim Bates, (404) 945-6709

KIM's Hobbies, 3305 Jasmine St., Honolulu, HI 96816, George Mirkiana, (808) 757-7135

Koh R/C Racing, 74 5563 Kuaia St., Kailua-Kona, HI 96740, Hobbys-Plus, (808) 329-3072

R/C Motorsports Hawaii, 98-029 Hualalai St., Aloha, HI 96703, Lane Parrish, (808) 487-6155

Team PRC Racing Club, Palms Government Rd., Palms, HI 96778, Charles Kawamoto, (808) 965-8216

Capital Dirt Burners, 1945 N. Trade Ave., Meridian, ID 83642, Jim Branden, (208) 888-7079

Dapco Hobbies, 2711 Garrett Way, Porterville, ID 83201, Pat Talbert, (208) 335-8163

Falls Hobbies & R/C Raceway, 1515 Northgate Mall, Idaho Falls, ID 83401, (208) 529-8650

MARA, 1229 Burnett, Lewiston, ID 83501, Rich Lee, (208) 743-4141

Victory Speedway, 5416 Anna St., Boise, ID 83705, Bruce Wallace, (208) 349-3173

Adam's Blast Track, RR 1, Box 370, Ash Grove, IL 61912, John Deffenbaugh, (217) 349-8447

CONNECTICUT

Craftech Raceway, Navesubase Mtn, Box 14, Bldg. 469, Grotton, CT 06349, Davey Piro, (203) 449-3217

CT R/C Off-Roaders, behind Old Field Station, Fairfield, CT 06430, Mike Rehnste, (203) 667-3145

Hobby World Raceways, 161-6 Woodford Ave., Plainville, CT 06067, (203) 493-1111

JP's Hobbies & Track, 54 Walker St., Trt. Seaboard, CT 06463, (800) 547-5772

K/N R/C Speedway Inc., West St., Stafford Springs, CT 06026, (203) 684-9896

MERCAR, 36 Glenalee Rd., Enfield, CT 06082, Phil Olsen, (203) 627-5410

R/C Madness, 540 Enfield St., P.O. Box 64, Enfield, CT 06082, Christopher Marz, (203) 741-6501

R/C Raceways Inc., 1265 John Fitch Rd., South Windsor, CT 06074, (203) 578-3661

R/C World/Sugar Hollow Speedway, 66 Sugar Hollow Rd., Danbury, CT 06810, (203) 745-2185

SCORA/Clayton's Off-Road Racing, 1414 Middleboro Ave., North Haven, CT 06473, Craig or Kathy, (203) 234-CLAY

Wallingford Indoor Racing, 63 N. Cherry St., Wallingford, CT 06497, (203) 265-4939

DELAWARE

Hobby Works Raceway, Hamler Shopping Center, Dover, DE 19901, Steve or Gordon, (302) 614-9123

Kennedy's East Coast Speedway, 3119 West Dupont Hwy., Millsboro, DE 19966, Russ Kennedy, (302) 934-1738

Mills Raceway, RD 2, Box 820, 8, Milford, DE 19963, Mike Roe, (302) 422-6766

T&C Raceway, Rt. 113, South Georgetown, DE 19947, Sam Thompson Jr., (302) 856-3804

T.N.T. Hobbies & Raceway, 609 Starr Hwy., Seaford, DE 19973-0464, Thomas Shawnee, (302) 628-6529

FLORIDA

B-T R/C Central, 811 Playground Rd., W. Warden Beach, FL 32547, (904) 863-2666

GEORGIA

A.R.C. Raceway, 350 Shirewood Dr., Lawrenceville, GA 30043, (404) 967-5194 or 962-8921

ARCAR Raceway, 6894 Bulford Hwy., Doraville, GA 30340, Greg Dean, (404) 448-4533

Carnesville R/C Speedway, Rt. 2, Box 2354, Carnesville, GA 30521, Bobby Maxwell or Byron Sartan, (404) 384-4870 or 384-4587

Case R/C Raceway, P.O. Box 1061, Trenton, GA 30752, (404) 657-6789

ILLINOIS

Adam's Blast Track, RR 1, Box 370, Ash Grove, IL 61912, John Deffenbaugh, (217) 349-8447

AJ's Raceway, Kessinger Road
DeKalb, IL 60115. AJ Schuler (815)
256-7722

AMERICAN

Ameri-Trac, R3, Box 242, Mattson, IL
61938. (217) 234-8707

AMERICAN

Badlands II, 420 W. Jackson St.
Mantoloking, IL 62421. (618) 283-2913

AMERICAN

BARR, 805 River Dr., Bazel, IL 61010
Jim Higgins. (312) 234-5615

AMERICAN

C&R Hobbies, 391 E. Jones, Milford, IL
60955. Ray Gragel. (815) 889-4973

AMERICAN

Centennial Park/Lemont Dirt Burners,
787, Robert Dr., Downers Grove, IL
60516. Scott Mosek. (708) 968-6411

AMERICAN

Central Illinois R/C Car Club, 7315 N.
Kinross Ave., Peoria, IL 61614. Wayne
Thompson. (309) 693-8885 or R/C
Workshop. 3100 S.W. Adams, Peoria,
IL 61605. (309) 673-4850

AMERICAN

Central R/C Raceway, RR 2, Box 51-A,
Carthage, IL 62826. Tom Stewart. (217)
854-9518 or Dan Rice. (217) 854-3785

AMERICAN

Diehard R/C Raceway, 300 N. Main
Kewanee, IL 61443. Dick Jennings.
(800) 852-3700

AMERICAN

Eagle Speedway, 305 N. Plum St.
Pontiac, IL 61764. Joe or Vickie
Rafferty. (815) 849-1738

AMERICAN

4-H Park Raceway, P.O. Box 424,
Pekin, IL 61551. Joe or Vickie
Rafferty. (815) 842-1738

AMERICAN

Hobby Raceway, 5027 4th Ave., Moline,
IL 61205. Tony. (309) 255-5534

AMERICAN

Hobby Town Raceway, 4611 W. Rt.
170, Mchenry, IL 60050. Mike
Schubert. (815) 444-1777

AMERICAN

Howell Racing, 492 E. 1st Ave., Naples,
IL 62562. Ed Howell. (708) 474-8821

AMERICAN

JC Hobbies/Metro Motor Speedway,
Metropolis Airport, Metropolis, IL
62454. (618) 524-9079

AMERICAN

JMP Raceway, 1567 Harrison Ave.,
Wood River, IL 62095. (618) 258-0292
or 0282

AMERICAN

Lakeside Raceway, S. Germantown,
Rt. 1, Boone, IL 62223. Scott Metcalfe
Alvin Fowler. (618) 426-4861 or 654-
2717

AMERICAN

Leisure Hours Hobbies, 2872 Plantaid
Rd., Jena, IL 60435. (815) 439-1477

AMERICAN

Liste Community Park Raceway, 1825
Short St., Lisle, IL 60537. Jim Bernick.
(708) 416-6944

AMERICAN

M&E Hobbies & Raceways, 300 N.
Madison Ave., Lake Villa, IL 60046.
Mark Kline. (708) 356-3274

AMERICAN

Machenesy Park, 1229 Shappell Dr.,
Machenesy Park, IL 61115. (815) 282-
1311

AMERICAN

Magnum R/C Speedway, RR #2, Box
491, Danville, IL 61832. Terry & Nancy
Dine. (217) 438-2472

AMERICAN

Marty's R/C Hobby, 1335 E. Broadway,
Bradley, IL 60915. Gail or Robert. (815)
933-8441

AMERICAN

Mercer Co. R/C Oil-Road, RR 3, Box
259, Milan, IL 61264. Janis & Wagat.
(309) 534-8324

AMERICAN

Midwest Hobby Trax, 114 Kirkland Cr.,
Unit A, Oswego, IL 60543. Duane
Peterson or John Kuehn. (708) 978-
BAGI

AMERICAN

Monroe R/C Raceway, 26049 Ridgeland
Ave., Monroe, IL 60449. (708) 534-2422

AMERICAN

Peoria R/C Raceway, 518 Hillside
Ave., Peoria, IL 61604. Ray Tigue. (309)
672-1780

AMERICAN

Precision Speedway, 3919 1/2 St., East
Moline, IL 61244. Dan Kennedy. (309)
736-2226

AMERICAN

The R/C Track, 15072 S. Artesian
Harvey, IL 60426. Edmund Johnson.
(708) 331-4079

AMERICAN

Radio Active Raceways, 751 N.
Bolingbrook Dr., #15, Bolingbrook, IL
60440. John or Terry. (708) 759-7557

AMERICAN

Redline Raceway, 921 Harding
Countryside, IL 60409. (708) 862-8181

AMERICAN

Rick's R/C Raceway, 122 W. 12th St.,
Streator, IL 61364. Rick Wallace. (815)
573-1370

AMERICAN

Rockford Scale Raceway, 6900 N. 2nd
St., Machenesy Park, IL 61111. (815)
765-0970

AMERICAN

SIRCAR Raceway, 1200 N. Marion
Carbondale, IL 62901. (618) 549-5885

AMERICAN

Slit Wing Hobbies Race Place, 1615
W. Springfield, Champaign, IL 61821.
(217) 359-1920

AMERICAN

Smithton Community Park, P.O. Box
8150, Belleville, IL 62221. (618) 236-
7589

AMERICAN

Superior Raceway, 1706 W. Bradley
Champaign, IL 61821. (217) 359-8073

AMERICAN

Thunderbolt Speedway, Intersection of
Pineburg and Dixie. Champaign, IL
61816. (815) 634-8050

AMERICAN

Tri-Star Racing, 3710 S. Hwy. 111,
Pentonville, Branch, IL 62040. Skip
Bennett. (618) 931-1206

AMERICAN

Valley Farms R/C Raceway, 206
Bypass Dr., Cherry Valley, IL 61016.
(815) 332-4515

AMERICAN

WJ's Riverside Raceway, 265 S. Clay
St., Jasper, IL 47546. Joe Lorey. (812)
482-3484

AMERICAN

Blaze'n Race'n, P.O. Box 6, Hannibal, IL
64537. James Berndt. (219) 867-1324

AMERICAN

Boone County Raceway, 1300 E. 100 S.
Rd., Lebanon, IN 46052. Jeff Moss or
Alvin Luper. (317) 487-4827

AMERICAN

CC Hobby & Speedway, RR 1, Box 68,
Francesville, IN 47946. (219) 567-2447

AMERICAN

Classic Hobbies, 420 E. Commercial
Lafayette, IN 46356. David Schellert. (219)
696-0649

AMERICAN

Clayhorn II, RR 4, Box 3521,
Veedersburg, IN 47987. Mike Rogers.
(317) 295-2582

AMERICAN

County Line R/C, 2333 W. State Rd. 38,
Sherridan, IN 46089. Greg Welch. (317)
758-6335

AMERICAN

Elliot's R/C Raceway, 2140 North
Platz, Kokomo, IN 46901. (317) 452-
0103

AMERICAN

Hobby Barn Raceway, 1950 Sunlight
Terre Haute, IN 47802-5694. (812) 299-
5773

AMERICAN

Hobby Masters, 5501 E. Rush,
Indianapolis, IN 46250. Jim Price. (317)
276-1961

AMERICAN

The Hobby Prescription, 115 S. Indiana
Ave., Auburn, IN 46706. Rosanne Fike.
(219) 925-6699

AMERICAN

Hobby World Raceway & Hobbies,
1508 N. Marian, Evansville, IN 47711.
Jeff Wassman. (812) 421-1100

AMERICAN

Jam Raceway, 291 E. Main St., Barker,
IN 46914. John Gussman. (317)
689-7537

AMERICAN

K&L Hobbies & Raceway, 3275 North
52nd W., LaPorte, IN 46350. (219) 324-
0353

AMERICAN

Main Hobbies, 605 Columbia
Lafayette, IN 47901. Randy Palmer.
(317) 742-2045

AMERICAN

Mooreville R/C Hobby, 7 Moore St.,
Mooreville, IN 46128. (219) 831-8827

AMERICAN

Mooreville R/C Hobby, 3201 S. State
Rd. 67, Camp, IN 46113. (317) 821-
8877

AMERICAN

P&T Hobbies and Raceway, RR 2 (Hwy.
60), Mitchell, IN 47446. Paul Weber.
Terre Haute. (812) 819-6666 fax
(812) 337-0018

AMERICAN

R/C Barn, 310 S. 125 W., Monroe, IN
46722. Mark Lemarch. (219) 692-6600

AMERICAN

R/C World of Indiana, RR #2, Box 335,
Lynn, IN 47355. (317) 874-2464

AMERICAN

R/C Zone & Raceway, 6380 W. 34th
St., Indianapolis, IN 46224. Russ or
Greg. (317) 290-0067

AMERICAN

Race St. Raceway & Hobby, 11261 1/2
Race St., New Castle, IN 47362. John or
Nancy Strong. (317) 521-4888

AMERICAN

Raceway Park, 919 E. McKelvey,
Mishawaka, IN 46545. Rob Bear. (219)
256-0020

AMERICAN

Radio Car Craft, 1825 S. Curry Pk.,
Bloomington, IN 47403. (812) 332-3245

AMERICAN

The Rink, 7900 Whitcomb, Merrillville,
IN 46410. Don Reiner. (219) 769-8113

AMERICAN

Runway Hobbies Raceway, 5347
Himwood St., Indianapolis, IN 46203.
Randy Hyatt. (317) 784-2421

AMERICAN

Winner's Circle Speedway, State Road
10 and 55, Riverway, IN 46310. Harold
Holmes. (219) 987-4106

AMERICAN

Barnyard Raceway, RR 1, Box 243,
Plymouth, IA 50656. Fred Good. (319)
276-4825

AMERICAN

Devil's Valley, 919 4th Ave. S.,
Clarke, IA 52732. (319) 243-7516

AMERICAN

Dubuque R/C Speedway, Dubuque
County Fairgrounds, Dubuque, IA
52001. Paul Connor. (319) 556-2736

AMERICAN

Hobby Haven Raceway, 2672 Hickman
Rd., Des Moines, IA 50322. Brian
Oakley. (515) 276-8785

AMERICAN

Kodak Race Track, Box 78, Okmoko,
IA 51355. Brad or Dave. (712) 332-7987

AMERICAN

M&M Racetrack, 2434 Pigeon Pt.,
Oklauga, IA 52577. (515) 653-6265

AMERICAN

Marble's Hobby Supply, 1685 St. John
St., Des Moines, IA 50320. Rick Marble.
(515) 262-7507

AMERICAN

Mr. Car Raceway, Central Iowa
Fairgrounds, Marshalltown, IA 50158.
(515) 483-2234

AMERICAN

North Park R/C Speedway, 805 S.
Jensen, Ames, IA 50011. (515) 296-
9352

AMERICAN

Plymouth County R/C Speedway, 4th
Ave. NE, Plymouth, IA. County
Fairgrounds, LeMars, IA 51031. (712)
546-8788 or 546-9537

AMERICAN

Power House Racing, 1200 S. Durbin
St., Granger, IA 50831. (515) 282-4582
or 282-4174

AMERICAN

Rotunda Raceway, 101 Bass, RR 1,
Box 1554, Storm Lake, IA 50588. (712)
732-4555

AMERICAN

Sibley Raceway, Graceland County
Fairgrounds, Sibley, IA 51249. Allen
Reck. (712) 254-2804

AMERICAN

Southwest Iowa R/C Raceway, Keel,
Park Ave. Oak, IA 51566. (712) 623-
5512

AMERICAN

Southwest Iowa R/C Raceway,
Montgomery County Fairgrounds, Red
Oak, IA 51566. (712) 623-5513

AMERICAN

Spencer R/C Raceway, 419 Grand Ave.,
Spencer, IA 51301. Strasser & Mc. (712)
263-2603 or 264

AMERICAN

Team Johnson Speedway, Jett Hwy. 34
& 14th, West Burlington, IA 52655.
(515) 553-9753

AMERICAN

Chad's R/C World & Raceway, 217
Broadway Ave., P.O. Box 46, Sutherland,
KS 66537. (913) 933-7313

AMERICAN

Ebersole R/C Superspeedway, 11417
W. Hwy. 54, Wichita, KS 67209. Tom
Ebersole. (316) 722-8888

AMERICAN

**Pittsburg International Mini
Speedway**, 5111 2 N. Locust, Pittsburg,
KS 66762. (316) 237-1973

AMERICAN

R/C Superdome & TO Pro Shop, 151
Ave. A, Hutchinson, KS 67501. (219)
668-6675

AMERICAN

R/C World & Raceway, 212 Broadway
Ave., Seward, KS 66537. Carl Green.
(913) 293-2913

AMERICAN

R&R R/C Raceway, 900 N. Santa Fe,
Salina, KS 66401. (913) 823-0962

AMERICAN

RCRC Raceway, 1001 N. 4th, Atwood,
KS 67739. Bob Turner. (315) 626-3277

AMERICAN

S&K Hobby Shop, 1113 S.W. 2nd St.,
Tepika, KS 66661. John Kravitz. (816)
493-3570

AMERICAN

Shawnee Hobby & R/C Raceway, 4603
Shawnee Dr., Kansas City, KS 66136.
Phil Pugh. (91

Track Directory

West Kentucky R/C Cars, 45 Hawkins Loop, Symsonia, KY 42082; (502) 851-3534



LOUISIANA

Acadiana R/C Hobbies & Raceway, 120 Toledo Dr., Lafayette, LA 70506; (318) 235-5825



Baha Raceways, 2225 Hickory Ave., Harahan, LA 70123; Bruce or Dan Rodriguez, (504) 737-6988



Cajun R/C Raceway, Rt. 2, Box 288 (Hwy. 343, Bosco) Church Point, LA 70525; Ray Thibodeaux, (318) 873-3855



Cajun R/C Raceway, 110 A Darbonne, Sulphur, LA 70815; Sandy Thibodeaux, (318) 527-9129



Loupe's R/C, 888A Madeline Ct., Baton Rouge, LA 70815; Mark Loupe, (504) 927-6275



Performance Hobby Raceway, 9135 W. Judge Perez Dr., Chalmette, LA 70004; Guy Trentecosta, (504) 271-2468



Red Dirt Raceway, 324 Pitkin Rd., Leesville, LA 71446; CJ Hall, (318) 535-9238



Red River R/C, 3232 East 70th, Shreveport, LA 71105; Pete Bradford or Ken Adcock, (318) 424-6325 or 929-7378



MAINE

Central Maine R/C Speedway, 18 Lithgow St., Winslow, ME, 04901; David Prescott, (207) 877-2232



Clay Bowl R/C Hobbies, P.O. Box 61, Greene, ME 04236; Pat Cap, (207) 946-5003



Fast Track R/C Raceway, P.O. Box 247, Gardiner Rd., Sabattus, ME 04280; Raymond Nadeau, (207) 375-4779



Hobbies Plus, 479 Elm St., Biddeford, ME 04005; John Williams, (207) 282-8838



Lake Region R/C Raceway, Route 302, Bridgton, ME 04009; George Kosiavelan, (207) 647-8831



Mementos Hobby Shop, 86 Sweden St., Caribou, ME 04736; (207) 498-3711



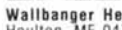
Rocket R/C Hobbies, Annabessacook Rd., Winthrop, ME 04364; (207) 377-6910



Sanford Speedway, 479C Elm St., Biddeford, ME 04005; (207) 282-8838



The Racers' Club, 85 Hubbard Rd., Berwick, ME 03901; (207) 698-5337



Wallbanger Heaven, 50 Elm St., Houlton, ME 04730; Jack Newman, (207) 532-3169



MARYLAND

ABC Raceway, 2825 Ocean Gateway, Cambridge, MD 21613; (301) 228-4291



Bel Air R/C Raceway, 227G Gateway Dr., Bel Air, MD 21014; Jeff Little, (410) 838-1229



Cockeysville Astrodome, 10824 York Rd., Cockeysville, MD 21030; (410) 666-1098



Doug's Hobby Shop Raceway, 2935 Crain Hwy., Waldorf, MD 20601; (301) 843-7774



40 Speedway, 933 Pulaski Hwy., Havre de Grace, MD 21078; Doug or Vince, (410) 538-3135 or 939-3588



Friendship Off-Road Racers, 1531 Florida Ave., Severn, MD 21144; (301) 551-3050



Fruitland Indoor Race Center, 203 N. Fruitland Blvd., Fruitland, MD 21826; Thomas Duncan, (410) 543-4329



Maryland RCC Track, 4201 G.B. Road, Seabrook, MD 30725; James Holes, (410) 322-6125



Radio Control Cars Inc., 13600-A Annapolis, Bowie, MD 20715; Paul Fauth, (301) 262-1444



Suzie Goose Hobbies, 718 E. Gude Dr., Rockville, MD 20850; (301) 279-2966



The Track, 16806 Oakmont Ave., Gaithersburg, MD 20877; Mimi Wong, (301) 417-9630



MASSACHUSETTS

Archer's Lane R/C Raceway, 118 Washington St. (Rt. 1), S. Attleboro, MA 02730; (508) 399-6762



C&C Hobby & Raceway, 562 Russells Mills Rd., S. Dartmouth, MA 02748; (508) 997-4131



Centerline Hobbies, 167 Corporation Rd., Hyannis, MA 02601; (508) 771-1244



CKS Raceway, 46 Wilbraham St., Palmer, MA 01069; (413) 283-2260



Julio's Hobby & Speedway, 1275 Main St. (Rt. 109) Milis, MA 02054; (508) 376-1933



Megadrome Raceway/BRCCR, N. Adams Plaza, Rt. 8, North Adams, MA 01247; Gordon, (413) 663-9593; Richard, (413) 445-4777; Warren, (413) 442-2566



Mike's Speedway, 1210 Federal St. (Rt. 9), Belchertown, MA 01035; Steve or Mike, (413) 253-9312



Naytrix Raceway, Holmes Rd., Pittsfield, MA 01201; Rick Welch or Nate Zuckerman (413) 443-2488 or 443-9886



North East Auto Racers, P.O. Box 12, Merrimac, MA 01860; George Denault, (508) 346-8456



R/C Hobbies & Speedway, 562B Reed Rd., N. Dartmouth, MA 02747; Rick or Dave, (508) 991-5040



West St. Hobbies, 114C Main St., Medway, MA 02053; (508) 533-1231



MICHIGAN

Baja Bayou Off-Road Raceway, 5313 W 22 Mile Rd., Tustin, MI 49688; Mike Langworthy, (616) 829-3447



Can-Am Hobbies Speedway Park, 1152 Gratiot, Marysville, MI 48040; Don Grinde, (313) 364-3338



Central Michigan R/C Raceway, 1270 James Savage, Midland, MI 48640; Mark Siebert, (517) 631-1488



Cereal City R/C Off-Roaders, 2000 E. Columbia Ave., Battle Creek, MI 49015; (616) 963-2506



Chatter Box Racing, P.O. Box 164, Old State Rd., Central Lake, MI 49622; Bill Altergott, (616) 544-9829



Dirt Slingers Raceway, 2460 S. M139, Benton Harbor, MI 49022; Tom Edwards, (616) 927-1431



DNR Speedways, 4630 Hill Rd., Harbor Beach, MI 48441; Kelcey, (517) 479-6097



Doug's Dirt Way, 5210 Colby Rd., Owosso, MI 48867; Doug Conn, (517) 723-3368



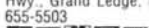
Elmer's R/C Speedway, 2683 Lakeshore Dr., Niles, MI 49120; Randy or Kristi Easton, (616) 683-7380



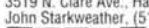
Farwell Park Raceway, 2781 E. Outer Dr., Detroit, MI 48234; Eddie McCray, (313) 967-0805



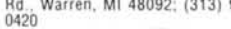
Fun Tyme High-Banked Oval, Fun Tyme Adventure Park, 6295 E. Saginaw Hwy., Grand Ledge, MI 48837; (517) 655-5503



Harrison International Speedway, 3519 N. Clare Ave., Harrison, MI 48625; John Starkweather, (517) 539-2921



JJ's R/C Speedshop, 5645 E. 13 Mile Rd., Warren, MI 48092; (313) 977-0420



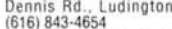
JT Superspeedway, 825 Golden Ave., Battle Creek, MI 49017; Jerry or Dan, (616) 965-0571



Larry's Performance R/C's, 3430 Highland Rd., Waterford, MI 48328; Larry Rossi, (313) 683-5529



Ludington R/C Raceway, 1483 N. Dennis Rd., Ludington, MI 49431; (616) 843-4654



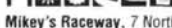
Mason County R/C Car Track, West Shore Community College, (611 N. Washington Ave., Ludington, MI 49431) Scottsville, MI 49454; (616) 843-8553 or 843-4837



MC-RC Raceway, 4601 Page Ave., Jackson, MI 49203; Sam Sprang, (517) 787-9161



Mikey's Raceway, 7 North St., Yale, MI 48097; Mike Huber, (313) 387-4308



NMRCC Raceway, 110 N. Ostego, Gaylord, MI 49735; Ed Schneider, (517) 732-3963



Pointe R/C, 2119 Summerton Rd., Mt. Pleasant, MI 48858; Frank, (517) 773-5711



R&B Raceways, P.O. Box 24, St. Louis, MI 48880; Russ or Brian Weaver, (517) 681-3688 or (517) 463-1886



R&L Hobbies, 9782 Portage Rd., Kalamazoo, MI 49002; Rex Simpson, (616) 323-3686, fax (616) 329-1744



R&S Hobbies & Raceway, 230 Mill St., St. Louis, MI 48801; Rich Beard or Scott Davis, (517) 681-3463



Rad & Bad Raceway, 810 S. Martin Rd., Gladwin, MI 48624; Mick Bushong, (517) 426-4373



Radio Wave Hobbies, 14000 Old 14 Mile Rd., Greenville, MI 48838; (616) 754-2170



Rider's Superspeedway, 42040 Koppnick, Ste. 400, Canton, MI 48187; Brent Martin, (313) 451-5599



Rider's Superspeedway, 4415 S. Westledge, Kalamazoo, MI 49008; Ken Penn (616) 349-2666



T/A Raceway, 119 N. Michigan, Big Rapids, MI 49307; Harvey, (616) 796-3217



Thumb Raceway, 3441 S. Main St., Marlette, MI 48453; (517) 635-7848



TNT R/C Raceway, 130 W. Washington St., Marquette, MI 49855; Gregory Berg, (906) 228-4098



USA Raceways, 6803 Dixie Hwy., Bridgeport, MI 48722; (517) 777-7054



Village Hobbies-n-Crafts, 17824 N. Maple Island, Hesperia, MI 49421; Alan or Fran, (616) 854-1374



MINNESOTA

ABC Raceway, 120 2nd St. NW, Pipestone, MN 56164; Ross Lange, (507) 825-5065



Ceason Sport & Hobby, 312 N. Bdwy, Crookston, MN 56716; Caesar Kaiser, (218) 281-6665



Dr. Skate's R/C Raceway, Frontage Road, La Crescent, MN 54601; Gary Bahrens, (608) 788-6141



Greater Minnesota Racin' Place, 3302 Southway Dr., St. Cloud, MN 56301; Jon Jackson, (612) 252-9768



Minn-E-Golf & Hobby, 9100 Park Ave., Elk River, MN 55330; (612) 441-8365



The PBR Off-Road Rally, 721 Cedar Ave., Hector, MN 55342; Philip Zempel, (812) 848-2129



Range Racing World, Inc., 412 Jones St., Eveleth, MN 55734; Bill, (218) 744-4423



Squid's R/C Autos, 924 Main Avenue, Moorhead, MN 56560; Jeff Greenwell, (218) 233-3554



Trackside Racing, 2300 Myrtle Ave., St. Paul, MN 55114; Winton Otfelle, (612) 644-3424



Wild West R/C Speedway, 2822 Piedmont Ave., Duluth, MN 55811; Roger Deloach, (218) 727-6248



MISSISSIPPI

Crossroads Raceway, Mall of Corinth, Rt. 1, Box 1, Corinth, MS 38834; (601) 287-2110



Dixieland R/C Speedway, 2535 Tabernacle Rd., Columbus, MS 39702; Jeffrey Alvey, (601) 328-9429



Fast Freddy's Raceway, 20390 Hwy. 49, Saucier, MS 39574; Mark Payne, (601) 832-0315



Joe McFaden Hobbies, 1619 51st Ave., Meridian, MS 39307; Joe McFaden, (601) 483-7000



Norm's R/C Hobbies, 602 W. Old Pass Rd., Long Beach, MS 39560; Norm, (601) 863-0524



Small Cars Unlimited, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST



MISSOURI

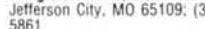
All Seasons Hobby, 152 O'Fallon Plaza, O'Fallon, MO 63366; Bob Daniels, (314) 281-8767



Blue Speedway, 12019 E. 47th St., Kansas City, MO 64133; Mark Randol, (816) 358-0238



Doug's Hobbies, 5221 Veil of Tears, Jefferson City, MO 65109; (314) 893-5861



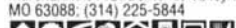
Fast Eddie's, 10 S. Coffman, Flat River, MO 63601; Eddie Smith, (314) 431-3303



Fast Trax Racing Assoc., 212 N. Luilwood, Springfield, MO 65802; Ken Pope, (417) 831-5046



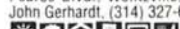
Gateway R/C Track & Hobbies, 255 Marshal Rd., P.O. Box 345, Valley Park, MO 63088; (314) 225-5844



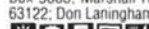
Harrisonville Hobby Shop & Raceway, 2301 S. Commercial, Harrisonville, MO 64701; Richard Taylor, (816) 887-3055



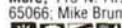
Hobbies 'n' Stuff Raceway, 102 W. Pearce Blvd., Wentzville, MO 63385; John Gerhardt, (314) 327-6006



Lafayette Riverside Raceway, P.O. Box 9663, Marshall Rd., Kirkwood, MO 63122; Don Laningham, (314) 966-8912



Owensville Raceway, Hobby Shop & More, 115 N. First St., Owensville, MO 65066; Mike Brune, (314) 764-3461



Ozark Hobby, Rt. 6, Box 24

Suppenbach Winter Racing, Route 5, Box 66, Pleasant Hill, MO 64080; Larry Suppenbach, (816) 987-5828



MONTANA

Bozeman R/C Powerhouse Track, west side of the Main Mall, Bozeman, MT 59715; (406) 586-6461



Garden City Raceway, 118851/2 Hwy. 93, Lolo, MT 59847; Dave Erickson, (406) 273-2776



Hobbytown Raceway, 17 Tai Lane, Bozeman, MT 59715; Tom Duncan, (406) 587-3512



Magic City R/C Raceway, 14th St. W. & Central Ave., Billings, MT 59101; (406) 259-9004



Pockets Raceway, Montana State Fairgrounds, Great Falls, MT 59405; Greg Vetter, (406) 761-7279



Stormer Raceway, 23 High Speed Road, Glasgow, MT 59230; Mike Stormer, (406) 228-4569



NEBRASKA

Hobby Town USA, Park Island Square, 3537 W. 13th St., Grand Island, NE 68803; Ed Conroy, (308) 382-3451



Mr. Bill's, 450 West 2nd St., Hastings, NE 68901; Bill J. Ries, (402) 462-4865



Over the Wall Gang, Higiroabee Speedway, 401 Market Pl., Norfolk, NE 68701; Matt Moeller, (402) 379-0879



RACE Raceway, 100757 Rd. J, Mitchell, NE 69357; Randy Schamaman, (308) 623-1490



Riverside Raceway, Hwy. 77 South, Fremont, NE 68025; Jeff Richter, (402) 721-3379



The Salvation Army, 4032 Harrison St., Omaha, NE 68147-1012; Lt. Michael Delashmitt, (402) 634-3414



Sidney R/C Oval Racers, 932 10th Ave., Sidney, NE 69162; Gale Talich, (308) 254-3131



NEVADA

AMS R/C Raceway, 1130 Icehouse Ave., Sparks, NV 89431; Terry Ramsey, (702) 355-8803



Little City Hobbies Raceway, 640 Kuenzki, Reno, NV 89503; shop, (702) 786-3611 or Bill Avery, (702) 358-7629



R/C Fever, 3580 Polaris, Suite 2, Las Vegas, NV 89103; Jim or Darin, (702) 367-RACE



Western R/C, 6404 Richmar, Las Vegas, NV 89139; Randy Grigg or Mitch Strete, (702) 897-7227



NEW HAMPSHIRE

Fastracker Club, 520 Washington St., Keene, NH 03431; Bill Phillips or John O'Connor, (603) 352-0811 or 357-8393



4-K Racing, 100 Warwick Rd., Winchester, NH 03470; (603) 239-6207



Hobby Etc., Heritage Place, Rt. 101A, Amherst, NH 03031; (603) 595-8549



Hooksett Hobby Raceway, 1328 Hooksett Rd., Hooksett, NH 03106; (603) 625-2420



Lake Region R/C Speedway, Lily Pond Rd., Laconia, NH 03246; Louie Blais, (603) 524-2909



NE Hobbies R/C Raceway, 49 Eaton Hill Rd., Auburn, NH 03032; Chuck Theriault, (603) 483-2274



Robert's Railroad & Hobbies, Box 431, Rt. 4 at Rt. 152, Northwood, NH 03261; Robert Jeffers, (603) 942-5193



NEW JERSEY

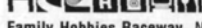
Al & Rich's R/C Speedway, 90 S. White Horse, Hammonton, NJ 08037; Ray Murray, (609) 561-7584



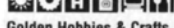
Dave Bicknell Memorial Raceway, P.O. Box 914, Absecon, NJ 08201; Rob Caruso, (609) 748-8291



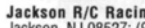
EMC Tracks & Trains, 1235 Rt. 23 South, Wayne, NJ 07470; (201) 628-4838



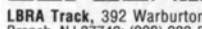
Family Hobbies Raceway, NW Blvd. & Weymouth Rd., Vineland, NJ 08630; Linda Vogel, (609) 696-5790



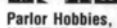
Golden Hobbies & Crafts, 415A Erial Rd., Pine Hill, NJ 08021; (609) 782-1222



Jackson R/C Racing, Marshall Ave., Jackson, NJ 08527; (908) 905-1593



LBRA Track, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122



Parlor Hobbies, 34 Broad St., Matawan, NJ 07747; Charlie Roder, (908) 566-3158



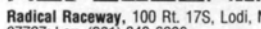
Pit Stop Dragway, Campus Rd., Totowa, NJ 07512; Kimberly Frank, (201) 942-5955



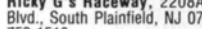
Pixley International Speedway, 763 Peters Dr., P.O. Box 189, Martinsville, NJ 08836; Richard Toole, (908) 560-0399



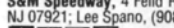
The Race Place, 1151 Hwy. 33, Farmingdale, NJ 07731; John Fary, (908) 938-5215



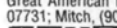
Radical Raceway, 100 Rt. 17S, Lodi, NJ 07727; Lou, (201) 843-6996



Ricky G's Raceway, 2208A Hamilton Blvd., South Plainfield, NJ 07080; (908) 753-1518



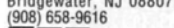
S&M Speedway, 4 Feild Rd., Bedminster, NJ 07921; Lee Spano, (908) 234-2750



Spernell Speedway, 2301 Rte. 9 North, Great American Flea Market, Howell, NJ 07731; Mitch, (908) 577-9191



Tri-Oval Speedway & R/C Center, 296 S. Main St., Phillipsburg, NJ 08865; (908) 454-2223



Truck Challenge, 1162 Rt. 202-206 N., Bridgewater, NJ 08807; Michael Gilli, (908) 658-9616



Zepplin Hobbies, 92 Rt. 23N, Riverdale, NJ 07457; Lou Ballini, (201) 831-7717



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'92 NORRCA Modified 2WD National Champion
'92 NORRCA Modified 4WD National Champion
'92 NORRCA Modified Truck National Champion
'92 ROAR Region 12 Modified 2WD & 4WD Champion
'92 ROAR Region 11 Modified 2WD & 4WD Champion
'92 ROAR Region 10 Modified Truck, Stock Truck & 2WD Champion
'92 ROAR Region 4 Modified 2WD & 4WD Champion
'92 ROAR Region 3 Modified 2WD Champion
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New XTR Part Numbers

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8022	Pro-22 XTR Coarse Spike 2.150" Rear 2WD or 4WD
8065	Pro-65 XTR Multi-Rib w/Staggered Mini-Bars 2.2" Truck Front
8080	Pro-80 XTR Original Mini-Pin Design 2.0" Rear 2WD or 4WD
8081	Pro-81 XTR Mini-Pin 2.150" Rear 2WD or 4WD
8082	Pro-82 XTR Fuzzie 2.150" Rear 2WD or 4WD
8090	Pro-90 XTR Original Mini Pin Design 2.2" Truck Rear
8092	Pro-92 XTR Fuzzie T 2.2" Truck Rear
8101	Pro-101 XTR World's Step-Spike 2.150" Rear 2WD or 4WD
8110	Pro-110 XTR Plus Step-Spike 2.150" Rear 2WD or 4WD
8120	Pro-120 XTR Coarse Spike 2.2" Truck Rear
8130	Pro-130 XTR Plus Step-Spike 2.2" Truck Rear
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Pro-Line USA, P.O. Box 456, Beaumont, CA 92223; (714) 849-9781.

Track Directory

NEW MEXICO

Hobby Connection Raceway, 1713 Indian Wells Rd., Alamogordo, NM 88519. Terry Hollings. (505) 437-0885

Roswell R/C Raceway, 1004 N. Underwood, Roswell, NM 88201. Larry Juniper. (505) 623-6893

TRC Race Park, 1305 E. 8th St., Fruit of the Looms, NM 88201. Gary Whitehead. (505) 884-3211

NEW YORK

A&D's FastTracks, 1000 N. Main St. Brevard, NY 10509. (914) 279-2065

A&S Race Center & Hobbies, 1201 Campus St., Canastota, NY 13317. (315) 309-5982/72

Adirondack International, 66 Elm St., Warrensburg, NY 12885. Matt or Jake Windman. (518) 623-9611

Aldon Speedway, 100 Castle St., Geneva, NY 14456. (315) 789-8343

Brookport Speedway, 6000 Saw-Ten Walker Rd., Brookport, NY 14420. Ray & Betty Gidder. (315) 634-6224

Brownie's Pro & Sport Hobbies, 124 Beckett St., Staten Island, NY 10307. (718) 496-1000

Cars, R/C & Guitars, 4360 Geneva St., West Seneca, NY 14224. (716) 674-0905

Capital District R/C Racers, 21 Venus Dr., Albany, NY 12205. Keith Green. (518) 783-7881

Catskill Regional R/C Raceway, Glenora Turnpike, Mt. Marion, NY 12566. (914) 339-3294

Central New York R/C Auto Racers, Muth St., P.O. Box 116, Rome, NY 13443. John Orr. (315) 336-5140

Chipmunk Hill R/C Raceway, 217 Pine St., Thurston, NY 13361. Ted Horne. (315) 628-5065

Creedside R/C Raceway Park, 5242 Route 238, Tuscarora, NY 14886. Lawrence C. Uggione. (607) 387-5513

D&J's Speedway, 94 Maple St., Cortland-Hudson, NY 13820. Dan Spitta. (607) 271-5297

Daytona Miniature Raceway, 59 Luma St., W. Babylon, NY 11704. (516) 491-4741

Dirt Track, 12 Fantasy Dr., Monticello, NY 13940. Bill Wroblewski. (516) 878-0731

Electric City Speedway, 956 State St., Schenectady, NY 12305. Jim Heiser. (518) 372-3290

Enjoyable Hobbies and Raceway, 260 Runkleskoma Ave., Lake Ronkonkoma, NY 11779. (516) 588-6994

FootHills R/C Racing Club, P.O. Box 1156, Maryland, NY 12116. Steve Zaherline. (607) 433-1860 or 437-2508

Bamlen's R/C Motor Speedway, 8453 Rt. 11, P.O. Box 1430, Cicero, NY 13039. Mike Woods. (315) 699-7991

GP Racing, 6785 Martin St., Route W 13440, Grey Philly, (515) 336-5140

HobbyTown USA, 629 Plunk Rd., Clifton Park, NY 12065. Larry Burwell. (518) 383-1215

Lakeside Raceway & Hobbies, 712 Willow Ave., Ilion, NY 14850. (607) 273-0248

Latest Hobbies & Raceway, 191 Rt. 25A, Rock Point, NY 11778. Joe John. (516) 929-8844 fax (516) 929-5092

LI 1/4-Scale Racers, 63 Heiton Dr., Huntington Station, NY 11746. (516) 351-5384

Maspeth Raceway, Rust St. & 57 Rd., Maspeth, NY 11378. Walter. (718) 897-7921

Mattituck Hobbies & R/C Raceway, 7335 Main Rd., Mattituck, NY 11957. Walt. (516) 298-2020

Norwood Hobbies Raceway, 2-4 S. Main St., Norwood, NY 13668. Tom Jarvis. (315) 353-6682

Performance Hobbies Raceway, 205 North Ave., Webster, NY 14580. Anthony Gault. (716) 621-1274

Performance Plus R/C Speedway, The Hobby Horse, 1141 2 Jones & Gifford Ave., Jamestown, NY 14301. (716) 488-1177

Queens Off-Roaders, 42-12 13th St., Long Island City, NY 11101. (718) 392-5766

R/C Competition Corner, K-Mart Plaza, Monticello, NY 13211. (315) 455-8718

R/C Hobbies, Rt. 49, Box 138, Constantia, NY 13044. Roy Catpoin. (315) 623-9536

R/C World Hobby Center, 69-57 Jumper Blvd., S. Middle Village, NY 11379. (718) 326-0002

RAS Hobbies, 356 Macedon Ct., Rd. Fairport, NY 14502. (716) 425-3722

Race O Rama, 44 Sharon Ave., Plattsburgh, NY 12901. James Varro. (518) 562-5442 or 643-2678

Ransomville, R/C Raceway, 2576 Academy St., Ransomville, NY 14131. Irene Preisch. (716) 791-8310

Rock River Model Hobbies, Rt. 2, Box 297, Rock River Rd., Interaken, NY 14847. Carl Schmidt. (607) 532-9489

Schoharie Co. R/C Car Club, P.O. Box 126, Cobleskill, NY 12043. (518) 234-4600

Seneca R/C, 2339 Yerkas Rd., Hamlet, NY 14451. (315) 789-8343

Skaneateles Raceway & Hobby, P.O. Box 102, Rt. 20, W. Genesee St., Skaneateles, NY 13152. (315) 685-8077

Small Torque Racers of Long Island, 24 Horton Rd., Huntington Station, NY 11746. George Frank. (516) 271-1119

South Shore Hobby & Raceway, 517 W. Roe Blvd., Patchogue, NY 11772. Don Hauck. (516) 758-5567

Southern Tier Raceway & Hobbies, 86 Paige St., Oswego, NY 13827. Chet or Anita Harding. (607) 687-6395

Team Earthquake, The Hobby House, 1141 2 Jones & Gifford, Jamestown, NY 14301. (716) 488-1177

Transit Speedway & Hobbies, 5319 Transit Rd., Dupew, NY 14043. (716) 684-3368

Ulster County Speedway, P.O. Box 71, New Paltz, NY 12561. Joe Colombo Jr. (914) 754-7664

Walt's Hobby, 2 Dwight Park Dr., Syracuse, NY 13209. (315) 453-2291

Western New York R/C Speedway, 58 Spring St., Cuba, NY 14727. Jason Compton. (716) 968-3586

Whitesboro Off-Road Raceway, 149-50 15th Rd., Whitesboro, NY 13257. Whitesboro Hobbies. (718) 767-6767

South Shore Hobby & Raceway, 517 W. Roe Blvd., Patchogue, NY 11772. Don Hauck. (516) 758-5567

Southern Tier Raceway & Hobbies, 86 Paige St., Oswego, NY 13827. Chet or Anita Harding. (607) 687-6395

Team Earthquake, The Hobby House, 1141 2 Jones & Gifford, Jamestown, NY 14301. (716) 488-1177

Transit Speedway & Hobbies, 5319 Transit Rd., Dupew, NY 14043. (716) 684-3368

Ulster County Speedway, P.O. Box 71, New Paltz, NY 12561. Joe Colombo Jr. (914) 754-7664

Walt's Hobby, 2 Dwight Park Dr., Syracuse, NY 13209. (315) 453-2291

Western New York R/C Speedway, 58 Spring St., Cuba, NY 14727. Jason Compton. (716) 968-3586

Whitesboro Off-Road Raceway, 149-50 15th Rd., Whitesboro, NY 13257. Whitesboro Hobbies. (718) 767-6767

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Hobbies, Etc., 5540 Atlantic Springs, Raleigh, NC 27604. Don Aspin. (919) 100-1444

Hobby Park, W. Clemmonsville Rd., Winston-Salem, NC 27103. Dick Butler. Parks & Recreation. (919) 727-7063

The Hobby Speedway, Hwy. 25, P.O. Box 279, Naples, NC 28760. Jerry or Kelda Bowers. (704) 684-9814

Joe's Hobby Shop & Raceway, Rt. 2, Box 682, B. Bessener City, NC 28016. (704) 435-2912

Jacksonville International Raceway, 1 Thompson St., Jacksonville, NC 28540. Penny. (919) 346-1522

Lucky 7 Hobbies, 1757 Hwy. 15, Creedmoor, NC 27522. Eddie Markham. (919) 528-2054

Mega Track of the Triad, 5540-195 Atlantic Springs Rd., Raleigh, NC 27604. Don Aspin. (919) 790-1444

Motorhead R/C Raceway, 125 Park St., Canton, NC 28716. (704) 648-7911

Mountain R/C Raceway, Hwy. 10, N. P.O. Box 57, Glenville, NC 28736. (704) 743-3709

Outlaws Fastrac Hobbies Raceway, 1013 D Hendersonville Hwy., Brevard, NC 28712. Jeff Laws. (704) 885-RACE (7223)

PC Hobbies, 143 Industrial Dr., King, NC 27021. Mike Ingles. (919) 983-2513

Reedy Creek Raceway, Rt. 14, Box 946, Centerville, NC 27530. (919) 731-4734

Rosewood Speedway, Rt. 5, Box 853, Goatsboro, NC 27530. Glenn Elam. (919) 731-4734

S&B Speedway & Hobbies, Rt. 1, Box 3114, Farmville, NC 27828. Ricky Strickland or Van Bibbs. (919) 753-4422 or 749-4468

Sandhills Raceway Inc., US #7 South, Aberdeen, NC 28315. (919) 944-7414

Smiley Face Raceway, 120 W. Center St., Mebane, NC 27302. (919) 563-3822

Speed Performance, 4121 Laker Monard Rd., Sanford, NC 27330. Howard Everett. (919) 774-3843

TLC R/C Raceway, Rt. 6, Box 321-A, Hwy. 601, Mocksville, NC 27028. (704) 492-7569

TNT R/C Raceway, 707 N. Salisbury Ave., Salisbury, NC 28159. Larry Mach. (704) 633-0647

Two Toms Hobbies, 155 Boone Square St., Hillsborough, NC 27278. Tom York. (919) 732-6221

Wilkes Hobby Thunders Valley Raceway, Rt. 1, Box 350-B, Wilkesboro, NC 28624. (919) 973-3734

Winston R/C Drag Series/Hobby Park Dragway, W. Clemmonsville Rd., Winston-Salem, NC 27103. (919) 983-9416

Winston R/C Drag Series/Hobby Park Dragway, W. Clemmonsville Rd., Winston-Salem, NC 27103. (919) 983-9416

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NORTH DAKOTA

Crystal Springs Off-Road, 1200 53 Ave. SW, Minot, ND 58701. (701) 857-8590

Hacienda HHS Speedway, 20 Macedonia, Minot, ND 58701. Kenen. (701) 859-4419

Northern Mini Racers, P.O. Box 415, Minot, ND 58702. Patrick McWetley. (701) 839-8868

AAAction Speedway, P.O. Box 6, Martin, OH 43337. Tom McKnight. (614) 465-9891 or Bill Harris. (614) 387-5812

A&D R/C Raceway, 5096 Rt. 127 S., Eton, OH 45320. Aaron Garrett. (513) 452-1612

Aerotech Raceway, 499 Appleton Rd., North Canton, OH 44720. (216) 498-1300

Alcral's R/C Raceway, 1370 Castro-Orangeville Rd., Brookfield, OH 44003. (216) 448-1573

Alternative Racing Association, Canton R/C Speedway, 2600 17th St., East Canton, OH 44730. Neal Everhart. (216) 484-2587

Bryan Thunderdrome, Tinseling Rd., Bryan, OH 43506. Jeff Thompson. (419) 626-9100

Buckeye Pulling Tracks, State Rt. 68, Xenia, OH 45385. Mark Hastings. (513) 376-8334

C/R Hobbies Top Race Track, 323 Center St., Ashland, OH 44804. Virginia Gagar. (216) 992-3833

Classic Hobbies & Raceway, 2845 W. Waterloo Rd., Akron, OH 44312. (216) 628-3222

D&J R/C Raceway, 801 W. Main St., Greenville, OH 44667. Don Feder or Mark Nussbaum. (216) 682-4266

D&S Hobbies Raceway, 7701 Ohio Rd., Centerville, OH 44307. (216) 364-2112

FFA Speedway, 1001 Ole Columbus Rd., Wooster, OH 44676. Roger Franks. (216) 264-1848

Flag City Raceway, 721 Rockwell Ave., Stark address, 3772 C.R. 18, Judda, OH 45840. Ruth Hubbard. (419) 427-5589

Golden Bear Hobbies, 154 N. Main St., Okla., OH 44667. Bob Rod. (216) 683-1250

Hi Tech Hobbies II, 116 S. Taylor St., Liverpool, OH 45140. Rick Lewis or Richard Koser. (513) 683-8900

Hobby Mania Raceway, 6097 Route 224, Lovelock, OH 44436. (216) 536-8282

Innovative Hobbies/Lakeside Speedway, 3421 Manchester Rd., Akron, OH 44319. (216) 645-1332

JB Hobby & Raceway, 3760 St. Rt. 701, Tipp City, OH 45371. Bob Curtis. (513) 645-8222

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JB Hobby & Raceway, 3760 St. Rt. 701, Tipp City, OH 45371. Bob Curtis. (513) 645-8222

KAR R/C Raceway, 14511 Seadrift Saline, OH 44460. Reid Jarvis (216) 537-4039

Lewisburg R/C Raceway, 395 US Rt 49E Lewisburg, OH 45338. Gene Butler (513) 678-9201

Medina City R/C Raceway, 3414 Remson Rd. Medina, OH 44256. Eric Pesto (216) 723-0256

Midway RaceTrack, 2601 Ashland Rd. Mansfield, OH 44905. Greg Jones (419) 589-4200

Parma Speedway, 5729 Ridge Rd. Parma, OH 44129. Sam Beliso (216) 845-3706

Paulding R/C Speedway, 103 N. Main Paulding, OH 45879. Virgil Simundinger (419) 238-9633

The Racer's Choice R/C Hobbies & Raceway, 1286 US Rt. 42. Mason, OH 45040 (513) 398-5539

RBI R/C Speedway, 110 Springdale Ave. Wintersville, OH 43952. Frank Lockard (614) 264-9101

Right Choice Hobbies, 7260 Garrison Ave. Cincinnati, OH 45217 (513) 353-3343

Sleepy Hollow Raceway Park, 11183 Spar Rd. Concord, OH 44027. Gary Wiedeman (216) 944-5898

Strongsville Speedway, 13315 Prospect Strongsville, OH 44136 (216) 922-0430

Trusso's R/C Raceway, 100 W. Crane Ave. Kent, OH 44240. B. (216) 673-0402

Way Out Hobbies, 5583 Centerpoint Rd. Georgetown, OH 45121 (513) 375-4994

Woodlane Raceway, 2300 E. Dorothy Lane Dayton, OH 45420. Jeff Simpson (513) 298-1166

Y-City Hobby & Speedway, 120 S. 6th St. Amesville, OH 43701. Kevin McKenna (614) 455-3025

OKLAHOMA

Ace Raceway, 2608-76B Villa Prom (Stephens Mall) Oklahoma City, OK (318) Mike McVish (405) 947-5937

Adams Creek R/C Speedway, 5207 S. 194th L. Ave. Broken Arrow, OK 74014. John Beigle (918) 355-1416

Coweta Hobby & Speedway, 310 S. Broadway Coweta, OK 74429. Donald Seabell (918) 486-3948

Off-Road Car Assoc. of Tulsa, 9720 Swan Dr. Broken Arrow, OK 74014. George Gooch (918) 486-4528

RCRC, 100 S. Vermont Suite 104 Oklahoma City, OK 73108. Rick or Steve (405) 947-7223

Sundown Raceway, 576 Virginia Ave. Pampa, OK 74601. Ryan Triant (409) 665-2832

Wild Country Speedway, 127 South Main, Porter, OK 74454. Charles McCollough (918) 685-0372 or 687-1686

OREGON

Catch Some Air, 44855 SE Wildcat Mountain Dr. Sandy, OR 97055. Erik (503) 668-8334

Competition Racing Assoc., 17911 NE Glisan, Portland, OR 97230. Mark Taylor (503) 257-0756

Fast Track Recreations, 18023 SE Aggie Rd. Milwaukie, OR 97267. Dale Welton (503) 659-7551

The Finish Line R/C Raceway, 580 W. D. St. Apt. 6. Creswell, OR 97426. Rod Garthner (503) 895-4395

Hobby Center, 1740 Geary St. SE, Albany, OR 97321. Ron Juhnke (503) 928-5255

MI Bachelor Radio Raceways, 225 Century Dr. Bend, OR 97701. Rex Baldwin (503) 389-6160

North Lawrence Raceway, 36 N. Lawrence Eugene, OR 97401. Gary Hill (503) 484-9857

R/C Plus Hobbies Raceway, 2029 25th St. SE. Salem, OR 97302-1130. Ron Smith (503) 364-9188

R/C Speed Center, 2810 N. Pacific Hwy., Medford, OR 97501 (503) 779-8298

Yamhill County R/C Car Club, 722 Meridian Ln. McMinnville, OR 97128. Larry Rucker (503) 472-7234

PENNSYLVANIA

A-1 R/C Speedway, 15 S. Hanover St. Hummelstown, PA 17036. Clyde Felker (717) 566-3335

Ansolat, 54 High St. Fairbairn, PA 15436. Timothy Abraham (412) 564-9956

B&B Raceway, 252 Geiger Rd. Philadelphia, PA 19115. Rod Smith, Doug or Dave Bruestle (215) 686-6086

BJ's Hobbies & Raceway, 570 E. Camping Area Rd. Wellsboro, PA 17365. Janet & Allen Wiley (717) 292-3723. fax (717) 292-3584

Brian's Raceway, 733 Flexer Ave., Allentown, PA 18103 (215) 435-1862

CEB Motors R/C Div., 5743 Molly P. Fisher Hwy. Marion, PA 17235. Charlie Booze (717) 375-4635

Clearfield R/C Car Club, P.O. Box 297, Clark Hill Rd. Hyde, PA 16843. Joe Welch (814) 765-3045

Cressona Mall Speedway, Rt. 61, Pottsville, PA 17901 (717) 385-3506

Curly's Hobby Shop, 4455 W. Ridge Rd. Hickory Plaza, Erie, PA 16506 (814) 835-1134

DARCAR, RD 1, Box 290 DuBois, PA 15801 (814) 375-0687

OC Ultra Oval, 13 York Rd. Warminster, PA 18974 (215) 672-5290

Denwick R/C Hobbies & Raceway, 5601 Lincoln Way East, Fayetteville, PA 17722. Charles Gadenhour (717) 352-3899

Dreamboat Hobbies, 2810 Pennsylvania Ave. W. Warren, PA 16365. Louis Dussau (614) 723-8052

East St. Raceway & Art Center, 747 E. Railroad Ave. Verona, PA 15147 (412) 826-0602

East St. Raceway, 736 East Railroad Ave. Pittsburgh, PA 15147. Steve Marino (412) 826-1324 (412) 826-0602

Henning Scale Models R/C Raceway, 128 S. Line St. Lansdale, PA 19446. Bill Henning (215) 362-2442

High Tek Hobbies, 13250 Rt. 30. N. Huntingdon, PA 15642. Ken Brooks (412) 864-5278

Hipkins Hobbies Raceway, 402 W. Mondlane-New London West Grove, PA 19389. Doug Hipkins (215) 869-8585

Hobby America Raceway, 5 Fitzsimmons St. Duke Center, PA 16729. Dan or Mike Coast (814) 966-3765

Hobby Heaven, 1845 Rt. 422 West, Indiana, PA 15701. Scott McAdon (412) 463-8010

Hobby House Raceway, Downtown Marketplace, Downingtown, PA 19335. J.T. Nelson (215) 269-1300

Hobby World Raceway, 172 Shillington Rd. Sinking Spring, PA 19608. Mike Wentz (215) 678-8760

JR Hobby Shop & Raceway, 1806 Nigle Rd. Erie, PA 16591. Ron Brader (814) 898-1816

Koontz's Home & Hobby Center, 1205 Hoover St. Pittsburgh, PA 15204 (412) 331-3866

Kranzel's R/C Raceway & Hobbies, 415-9. Wesley Ave. Lemoyne, PA 17043. David or Stuart Kranzel (717) 737-7223

L&R R/C Racing, 15 S. Main St. Red Lion, PA 17356. Larry & Randy Shoemaker (717) 244-1108

Main Hobby Race Center, 501 E. Lackawanna Ave. Olyphant, PA 18447. Dave or Zig (717) 489-4586

Marshall's R/C Raceway, RR 4 Box 640, Honesdale, PA 18431. Bill or Oot Marshall (717) 729-7458

Modelbahn Oil Hobbies, 1145 E. Philadelphia Ave. (Rt. 73) Gettysburg, PA 19525 (215) 367-5925

Mountain R/C Raceway, 918 S. Park Ave. Somerset, PA 15501. Bob Rhodes (814) 445-4085

Mt. Laurel Speedway, 835 B. Hunter Lane Reading, PA 19605. Jim Vaccaro (215) 921-0776

New Garden Farms/Mushroom Bowl, 812 W. Cypress St. Kennett Square, PA 19348. Drew Pannell (215) 444-1850

Pit Stop Hobbies, 262 W. Main St. Mount Airy, PA 17552. James F. Stewart Jr. (717) 653-6222

Pro Challenge Raceways, Wycobben Ave. (P.O. Box 536) Landsdowne, PA 19050. Bob Baldwin or Bob Paskauske (215) 622-7651

Prop & Wheels Raceway, 139 W. Broadway, Lumbago, PA 18252 (717) 668-2288

R&D Hobbies & Raceway, 5101-C Johnston Rd. Harrisburg, PA 17112. 2924. Doug Bishop (717) 545-4984. fax (717) 545-5306

Race Place Hobbies, 201 Signal Rd. Quakertown, PA 18951 (215) 538-2584

Radio Controlled Pro Speedway, Rt. 487N, Stillwater, PA 17878 (717) 387-0265

RCO Raceway, 519 Broadway, Hanover, PA 17131. Chris Shaffner (717) 633-9190

Riverside Raceway, PA Ave. W & Hickory, Warren, PA 16365. Jeff (814) 723-4211

Rolling Wheels, West Hills Shopping Center, Coraopolis, PA 15108. Peggy (412) 262-4858

South Mountain R/C Speedway, 3574 Hurricane Rd. Wernersville, PA 19385. George Menke (717) 267-4736

Staub Bros. R/C Speedway, 31 Locust St. Gettysburg, PA 17325. Todd or Scott Staub (717) 334-5445

T&T Radio Controlled Racing, Randolph Rd. Great Bend, PA 18821. Jack (610) 773-8603

TC's R/C's, 1537 Freepont Rd. Nantona Heights, PA 15065. Tom Conale (412) 226-8802

Trains and Lanes, 3812 Newburg Rd. Easton, PA 18042. Jeff Sere (215) 253-8850

Wagonhill Hobbies, 967 New Castle Rd. Rt. 422, Butler, PA 16001. Jeff Hyatt (412) 865-9817

PUERTO RICO

Cachon Off-Road Track, Box 952, Barrio Aguas, PR 00794 (809) 857-0341

Cidra R/C Track, Carr. 7787 Km 1.6, Barrio de Adentro, Cidra, PR 00904 (809) 739-1572

Cachon Off-Road Track, Box 952, Barrio Aguas, PR 00794 (809) 857-0341

East Bay Hobbies, 629 Melancon Ave., Bristol, RI 02809 (401) 754-0778

R/C Hobbies, 47 Sandvinton Rd. Coventry, RI 02816 (401) 823-4335

Tri-State R/C Raceway, 205 N. Main Rd. Warrenton, OR 97146 (503) 258-4918

SOUTH CAROLINA

Bandit's Performance R/C Hobbies, 203 E. Main St. Charleston, SC 29512. Bruce Hinkle Jr. (804) 393-3333

Berea R/C Speedway, 1915 S. Church St. Berea, OH 44008 (216) 246-4702

Capitol City Raceway, 1395 Leaning Pt. Columbia, SC 29223. Jim Medley or Bruce Street (803) 768-1247 or 768-4681

Coastal R/C Speedway, 855 E. Hwy. 944. Myrtle Beach, SC 29577. James Walker (803) 238-5084

Inland R/C Speedway, Rt. Neelwood Lane, Myrtle Beach, SC 29577. James Walker (803) 238-1255

Mid-Carolina R/C Superspeedway, 1202 W. Highway 101, Rock Hill, SC 29727. Fred Penick (803) 376-8078

Monaco's Raceway, 1211 E. Route 1, Vero Beach, FL 32984. R. R. Goussier (888) 229-8688

Palmetto Raceway, 5025A River Ave., Ft. Charles, SC 29516. 803-566-6008

R/C Speed Shop & Raceway, 217, Plant Springs Rd. W. Columbia, SC 29169. Eric Provost (803) 251-0775

Sidewinder's R/C Raceway Park, 103 E. West Lenoir St. Greenville, SC 29615. Larry Simpson (803) 344-1444

Simpsonville International R/C Speedway, 3099. Bantam, Rt. 1 Simpsonville, SC 29687. Larry Simpson (803) 294-3572

TBS Superspeedway, 636 Hwy. 154, Hartsville, SC 29550. Larry Simpson (803) 332-1111

SOUTH DAKOTA

CSF Speedway, Central States Fairgrounds, Great W. Arts Bldg. 800 San Francisco St. Rapid City, SD 57702. Steve Latschek (605) 332-5292

Dakota Off-Road Racers, 2963 W. 18th Cir. 12 Aberdeen, SD 57401. John 226-9634

1/8-Scale Off-Road, 2988 W. 18th Cir. 12 Aberdeen, SD 57401. Brian Hargrave (605) 225-0995. Fax (605) 226-0604

Flags of Fun R/C Raceway, 2902 E. 1st St. Rapid City, SD 57702. Rex Gaudin or Steve Latschek (605) 347-7184

TENNESSEE

Action Hobby Shop, 4724 E. Memorial Memphis, TN 38116. Bob Schreiner or Justin A. (901) 496-2800

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Track Directory

AIR Raceway, B-Pass Hobbies, 1114 Hwy. 11, N. Athens, TN 37303. Bill Burns (615) 44-8999

Butturi's Best Raceway, 4828 George Williams, Knoxville, TN 37922. Steve Butturi (615) 531-0325

Crash-n-Burn R/C Raceway, 7030 Maynardville Pike, Knoxville, TN 37918. Gary Daniel (615) 922-8722

Competition Park, Rt. 10, Box 268, Crossville, TN 38555. Terry or Yvette Bowen (615) 277-5048

Cumberland Valley Raceway, P.O. Box 233, Ashland City, TN 37015. Jamie Pale (615) 792-4371 ext. 1195

DSM's Downtown Raceway, 2703 US Hwy. 411S, Maryville, TN 37303. (615) 681-8919

Estill Springs Raceway, P.O. Box 187 Hwy. 41 N. Estill Springs, TN 37330. David or Wendy Panter (615) 649-5113

Hobby World Raceway, 185 S. Jefferson, Cookeville, TN 38501. Scott Larner or Scott Watson (615) 528-2808

Lail Speedway, 812 Wells Rd., Maryville, TN 37801. Jack or Chris (615) 983-9267

Mad Dog Motorsports, 702 Joy St. (Rt. 3, Box 247), Paris, TN 38242. Dan Mobley or Mike Andrews (901) 642-7294 or 644-1523

MSA R/C Racing, Rt. 12, Box 489 B, Crossville, TN 38555. D.R. Fendley (615) 456-0022

Panther Traxx, 7030 Maynardville Hwy, Knoxville, TN 37918. Gary Daniel (615) 922-8722

Raceplace, 215 Lynn Garden Dr. Kingsport, TN 37660. Randy Harbin (615) 378-3336

Rivergate Hobby Center, 200A Two Mile Pkwy., Goodlettsville, TN 37072. David Hill (615) 859-3455

RMD Raceway, 175 Seavers Rd., Jackson, TN 38301. Travis Robertson (901) 424-0263

Smitty's Hobbies & Raceway, 6021 Dayton Blvd., Chattanooga, TN 37415. David Smith (615) 877-9442

TNT Pro Hobbies, 5529 Pleasant View #2, Memphis, TN 38114. Tim Howell (901) 377-0013

Tuckasee Off-Road Raceway, 1004 Mayette Rd., Clarksville, TN 37042. Penny Hayward (615) 645-2635

TEXAS

AA Raceway, 1612 Tonney Rd. Austin, TX 78704 (512) 474-8277

Anchored Acres Raceway, 1101 Sheppard Rd., Burkburnett, TX 76354. Bob & Patricia Voth (817) 569-1707

Austin R/C Center, 9702 Gray Blvd. Austin, TX 78758. Gailon Cobb (512) 832-8144

B&C Speedway, 201 Enterprise Row #101, Conroe, TX 77301. Bobby Hillin (409) 760-1986

Budget Raceway, RR 1, Box 400-35, Bruceville, TX 76630 (814) 859-5296

Checkered Raceway, 7121 Perimeter Park, Suite 214, Houston, TX 77099. Rod Ward (713) 849-3054

Dove R/C Speedway, 400 South 1-35, Bruceville, TX 76663. Curtis A. Rowe (817) 757-1150

Eagle Hobby Center, 3601 Shepherd Ranch Springs, TX 75180. Terry Cooke (214) 557-5290

Easter Raceway, 45000 Hwy. 59 N., New Caney, TX 77357. Heinz Falke (713) 399-1527

Hal's R/C Raceway, 1440 Bessemer E. Paso, TX 79936 (915) 591-2713

Heart o' Texas Hobbies & Raceway, 309 W. Hwy. 190, Copperas Cove, TX 76522. Larry Gholson (817) 547-7505

Indy R/C World, 220 Mesquite Village, Mesquite, TX 75150 (214) 686-7744

J&K Speedway, 201 Enterprise Row, Suite 101, Conroe, TX 77301. J&K Hobbies (409) 760-1986

Outlaw Speedway, Rt. 5, Box 173-3R, Lubbock, TX 79407. Derrell Butcher (806) 885-4406

R/C Hobbies Raceway, 8500 Dyer #36, Sumner Centre, Ft. Paso, TX 79904. Tim Munger (915) 751-1664

R/C Pro Shop, 12201 West County Road #129, Odessa, TX 79765

R/C Raceplace, 3546 A N. Main, Cleburne, TX 76031. Bruce Myers or Linda Arhoni (817) 558-2472

Randy's Hurricane Speedway, 9600-B Old Katy Rd., Houston, TX 77055. Randy Menchew (713) 464-8020

Rebel Hobbies & Raceways, 11925 Jones Maltsberger, San Antonio, TX 78216. George Norris (210) 496-2396 fax (210) 456-3294

Rivcity Speedway, 11731 Werners, San Antonio, TX 78247. Ralph Hernandez (210) 359-6870. Joe Toledo (210) 341-5652

Ron's R/C Hobbies & Raceway, 255 Lombardy, Dallas, TX 75220. Ron Salsom (214) 357-3453

Southside R/C Raceway, 4409 FM2351, Friendswood, TX 77546. Roy Baxter (713) 992-3541

Spring Creek R/C, 45 Fisherman's Rd. San Angelo, TX 76904. (915) 944-3850

Star/Car Raceway, 3908 Patton St. Corpus Christi, TX 78415. Dave Hummel (512) 853-0720. Race Hotline (512) 881-6105

Star R/C Hobbies, 803 Garcia St., Port Isabel, So. Padre Island, TX 78578. Fred Carr (512) 943-7546

T&T Eagle, 161 W. Spring Creek Pkwy. #601, Plano, TX 75023. Tony Welborn (214) 517-0562

Texas Speedway, 6707 Chimney Rock, Houston, TX 77029. I&I Hobby Center (713) 661-7137

Texas State Raceway, 3703 Seymour Rd., Wichita Falls, TX 76309. Chip Warman (817) 692-2065

TK's R/C Park, 2921 Old Claude Hwy., Amarillo, TX 79101 (806) 622-0017

Wes Hobby, 980 S. 4th St., Beaumont, TX 77701. Edmond Richards (409) 839-4929

Wild Bill's, 535 E. Shady Grove, Irving, TX 75060. Lynn Morgan or Jerry Williams (214) 438-9224

UTAH

Hansen Intermountain R/C Raceway, 8481 W. 2700 S., Magna, UT 84044. Kevin Hansen (801) 250-8303

High Anxiety, 271 N. Danteo Dr., St. George, UT 84770 (801) 673-8331

JD's Intermountain R/C Raceway, 1500 E. 1748 S., Vernal, UT 84078. John or Dora Frankovich (801) 789-3930 or 789-8337

Power Hobbies & Raceway, 135 Nu 900 East Suite 7, St. George, UT 84770. April Nutley (801) 628-8747

Vision Hobby Raceway, 3528 N. State St., Gretna, UT 84057. Vision Hobbies (801) 226-6226

WOR (Wasatch Off-Road Raceway), 3170 Bruker Ave., Ogden, UT 84401. Ultimate Hobbies (801) 733-0933

VERMONT

Barre Town R/C Club, Wall St. Complex, S. Main St., Rt. 14, Barre, VT 05641. Danie. Guyette Sr. (802) 229-0639

Green Mountain Superspeedway & Hobbies, Elm St., Winooski, VT 05404. Charles Barsalow (802) 893-2660

Hard Rock Raceway, Astrachan Dr., Bennington, VT 05201. Darren Ricchi (802) 447-2656

Mike's Hobbies & Raceway, 162 N. Main St., Rutland, VT 05701. Stephen Rachis (802) 775-0069

Riverside R/C Speedway, Roy's R/C Hobbies, 700 Elm St., Winooski, VT 05404. Charles Barsalow (802) 893-2660 or 893-2332

VIRGINIA

A-1 Raceways, 940 Radford Rd. Christiansburg, VA 24073. Kay or Charles Franks (703) 381-9731 or 382-1173

Bob's Hobbies & Raceway, 910-J Brandy Creek Dr., Mechanicsville, VA 23111. Bob Wagner (804) 746-2758

Cooper's R/C Raceway, Rt. 4, Box 1228, Chatham, VA 24531 (804) 724-1182

Craftech Challenge, Naval Base D-4 Piesaw St., Norfolk, VA 23455. Bernie Duffin (804) 444-3846

Crossroads Hobbies R/C Raceway, 1104 W. Main St., Salem, VA 24153. Ronnie Black (703) 387-3414

Fairystone R/C Speedway, Rt. 4, Box 918, SR535, Stuart, VA 24171. Pat Mount Jr. (703) 930-3984

Front Royal R/C Racing Association, P.O. Box 1252, Front Royal, VA 22630. Pete Pinnimy (703) 636-6149

H&S R/C Raceway, 565 Electric Rd. Salem, VA 24153. Henry Dowd or Stacy LaPrade (703) 343-4012

Hobby Hanger Speedway, 4433A Brookfield Corp. Dr., Chantilly, VA 22021. Kwang Ko (703) 631-8820

Hobby Shack and Track, Route 2, Box 184, St. Stephens, OH, VA 23148. John or Laura Holder (804) 769-1311

KC's Radio Control & Repair, Rt. 4, Box 312, Friends Ferry Rd., Lynchburg, VA 24503. Curtis or Kim Wright (804) 384-8596

Lane's End Raceway, P.O. Box 153, Bridgewater, VA 22812. Tony Strother (703) 878-6655 or 3471

Mid Atlantic Raceway, 89 E. Elizabeth St., Harrisonburg, VA 22801 (703) 433-3952

NSWC MWR R/C Track, 61243C Oakhigen, VA 22448. Doris Copen (703) 663-1730

SHAMROC, P.O. Box 3739, Winchester, VA 27604. Glenn Bland (703) 888-3927

Sterling Truck & Auto Racers, 20921 Davenport Dr., Sterling, VA 22170. Ron Beckman (703) 444-0333

The Tillyard, Rt. 1, Box 235A, Dayton, VA 22801. Homer W. Almar Jr. (703) 828-3476 or 828-6655

Trainland R/C Club, 5661 Shoulders Rd. Rt. 5, Suffolk, VA 23435. Frank Stevens (804) 483-2331

Winners Circle, 3236 W. Gray St. Richmond, VA 23230 (804) 355-7076

WASHINGTON

Allie's, 108 South K St., Aberdeen, WA 98502 (206) 533-6636

Arlington Heights Speedway, 13629 278th St. NE, Arlington, WA 98223. Shaan Bussert (206) 435-3442

Firgrove TNT Raceway, 10611 136th Pl., Puyallup, WA 98374. Walt Hale (206) 845-7875

Four Season R/C Racing, 2941 Seater Kinney Rd. NE, Olympia, WA 98506. Gary & Sharon Brown (206) 491-2430

Hank Perry Race Complex, Sullivan Rd., WA 98213 (509) 927-1879

L&L R/C Raceway, 15818 SE 287th Kent, WA 98042. Eric Lake or Bob Lewis (206) 639-1241 or 631-1664

NORA Performance R/C, P.O. Box 555 (1673 Cogardale Rd.), Mt. Vernon, WA 98273 (206) 755-9464

Raceway Hobbies, 188 Sunset Ave. S. Edmonds, WA 98020. Dave or Ron Steen (206) 774-3285

Schmidt's Auto Parts, 10305 Old Hwy. 99, Marysville, WA 98271. Jon Filla (206) 653-8838

Spokane Indoor Raceway, L. 6422 2nd Ave. Spokane, WA 99212. Mike Gindem (509) 534-RACE

Tacoma R/C Raceway Hobbies, 6305 6th Ave., Tacoma, WA 98406 (206) 565-1935

Terror Raceway, 8012 S. Tacoma Way, Tacoma, WA 98499. Dave Kleinman (360) 584-8658

WEST VIRGINIA

Burr-Fab Raceway, 90 Davis St., West Union, WV 26456. Mark Travis (304) 873-2487

D.W. Reed's, 142 West Main Bridgeport, WV 26330. David Reed (304) 842-2742

Fairmont R/C Raceway, 430 Fairmont Ave., Fairmont, WV 26554. Ed Kirby (304) 363-5509

Fulton's R/C Raceway, 2646 Chapin St., Wheeling, WV 26003. James Fulton (304) 233-5355

R/C Race Place, Rt. 10, Box 351, Morgantown, WV 26505 (304) 292-2871

R/C Speed, Rt. 1, Box 363, Rochester, WV 24970. Joe (304) 647-4762

WISCONSIN

ABC R/C, 1441 B. East Main St., Waukesha, WI 53186. Dick (414) 542-1245

Antigo Hobby, 311 Superior St., Suite 1, Antigo, WI 54409 (715) 625-7655

Arena Park Raceway, Kenosha County Parks, 7727 60th Ave., Kenosha, WI 53142. David Delahou (414) 652-6377

Fox Valley Off-Road Racing Club, Rt. 1, Mayflower Rd., Hortonville, WI 54944 (414) 739-9211

Frog's R/C Raceway, Rt. 1, Phillips, WI 54555 (715) 339-2314 or 339-2958

Gary's Hobby Center, 3701 Outland Ave., Racine, WI 53403. Ron (414) 554-8884 or 1-800-894-6229

Grant County Speedway, 2125 Oak Hazel Green, WI 53811. Brad Bickette (808) 854-2746

Hobby Headquarters, 123 North Frank in St. Paul, Washington, WI 53074. Jesse Kasten (414) 284-8850

Hobbytown Speedway, 4231 8th St. S. Wausau Rapids, WI 54494 (715) 421-1222

Shoreline Raceway, 1231 1st St. S. Wausau, WI 54494 (715) 421-1222

JJ's Dirt Heaven, 6028 County K, Champion, WI 54229; (414) 866-9096



Maniac Motors Raceway, 244 Rt. 1 A1 Rt. H, Kendall, WI 54638; (608) 462-8935



MARCCA Raceways, 1810 S. Park St., Madison, WI 53713; Jeff Gundlach, (608) 273-0519



Midwest Tri-Clone, 144 N. Main St., West Bend, WI 53095; (414) 334-0487



Mitch's Finish Line R/C Inc., 786 Morris Ave., Green Bay, WI 54304; (414) 497-5057



Muskyland R/C Raceway, Rt. 10, Box 269, Hayward, WI 54843; Jim Ahrens, (715) 634-2109



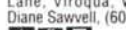
Pacific R/C Club, W7990 Hwy. P, Pardeeville, WI 53954; Rhys Brenner, (608) 742-7100



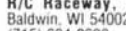
R/C Hobby Off-Road Track, Lewison Lane, Viroqua, WI 54665; Dan and Diane Sawvill, (608) 637-8221



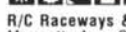
R/C Raceway, 2239 Cty. Rd. E., Baldwin, WI 54002; Lance Van Damme, (715) 684-2690



R/C Raceways & Hobbies, 181 W. Marquette Ave., Oak Creek, WI 53154; Ralph & Cathy Augustino, (414) 764-9701



Radio Mania, 129 Harrison St., North Prairie, WI 53153; Bill Bowes, (414) 392-9515



Richland Center R/C Off-Road Racing Club, Fairground Rd., Richland Center, WI 53581; Rick & Cheryl Stussy, (608) 647-7313



Sparta R/C Raceway, Golf Course Rd., Sparta, WI 54656; Eric Johnson, (608) 269-5861 or 269-6613



Stoltz Raceways, 548 Summit Dr., West Bend, WI 53095; (414) 338-6097



Trackside Raceway, 4405 W. Bradley, Milwaukee, WI 53223; Joel Gish, (414) 355-1910

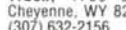


West Bend Hobbies, 144 N. Main St., West Bend, WI 53040; (414) 334-0487



WYOMING

Collectable Creations Off-Road Oval Track, 1790 Dell Range Blvd., Cheyenne, WY 82009; Phil Severson, (307) 632-2156



AUSTRALIA

Wodonga R/C Car Club, 11 Murphy St., Wodonga, VIC 3690; Ron Langman, 011-6160-247-128



Aubry R/C Car Club, Aubry Showgrounds, Aubry, NSW 2640; Ron Langman, 060-247-128



BELGIUM

Cartroubles Indoor Buggy Track, Jan Moonsstraat 52-56, 2160 Wommelgem, Belgium; Guy Ermes, 32-326-51-15, fax, 32-326-51-01



BRAZIL

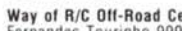
Hobby Center, SOS.210 BLH Apt. 204, Brasilia, DF-Brasil 70.273; 061-242-0488



Off Readers, Av. Guillerme Dummont Villars, 317, Sao Paulo, CEP 05640; Waldir Ielpo, (055) 011-260-5628; fax (055) 011-831-4931



Way of R/C Off-Road Cerrado, Rua Fernandes Tourinho 999, 4th Floor, Belo Horizonte, MG; Claudio Teodoro Corréa, (55) 31-223-3676

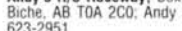


CANADA

Action Wheelz, 462 Turcotte, Vanier, Quebec, G1M 1R6; Regent Tardif, (418) 527-5756



Andy's R/C Raceway, Box 423, Lac La Biche, AB T0A 2C0; Andy Bryks, (403) 623-2951



Aprilia Track, 20 Parsons Ridge, Kanata, Ontario K2L 2N4; (613) 836-2577



ATN, 2000 Paul Hubert, Nicolet, Quebec J0G 1E0; Louis Durand, (819) 293-6097



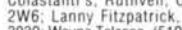
Autodrome des Prairie, 935 Boul. St-Luc, St-Luc, Quebec J0J 2A0; (514) 348-0718



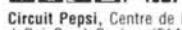
Cactus Speedway, Con. #3 Ruthven at Colastanti's, Ruthven, Ontario N8N 2W6; Lanny Fitzpatrick, (519) 735-3039; Wayne Telasco, (519) 966-0702



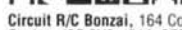
Circuit Pepsi, Centre de Location, 37 du Roi, Sorel, Quebec; (514) 746-8828



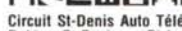
Circuit R/C Bonzai, 164 Cowie, Granby, Quebec J2G 3V3; (514) 372-3622



Circuit St-Denis Auto Téléguides, 292 DuLion, St-Denis sur Richelieu, Quebec, J0H 1K0; Francois Rivard, (514) 787-1127



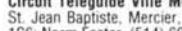
Circuit Teleguide Ville Mercier, 1101 St. Jean Baptiste, Mercier, Quebec J6R 1C6; Norm Foster, (514) 699-4003



Club AVATT, 244, rue Hotel de Ville, Deauville, Quebec; Daniel Vanier, (819) 864-6262



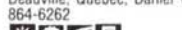
Crash Course, Box 9, Site 8, RR #1, Spruce Grove, Alberta T7X 2T4; Tim Starrevied (403) 963-5795



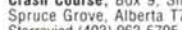
CRCC, Box 309, Clinton, Ontario NOM 1L0; Eric Russell (519) 482-9429



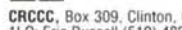
Dynamic Hobbies, 21 Concourse Gate, Unit 6, Nepean, Ontario K2E 7S4; Clark Freeman, (613) 225-9634



East Coast Model Center Raceway, 13 Glen Stewart Dr., Suite 1, Southport, Prince Edward Island, C1A 8X9; Gary Stephen, (902) 569-3262



East Wind Farm, R/C Corral, Perimeter Hwy., Plessis Rd. South, Springfield, Manitoba, Chito De Jesus, (204) 775-9180



Fast-Trax Speedway, RR 4, Trenton, Ontario; Russ McPeak, (613) 394-6411



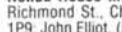
The Glass Castle Off-Road, RR#7 Trans Canada Hwy., Duncan, B.C. V9L 6P4; Don Douthright, (604) 746-6518



GRSCR, 9 Gauthier, St-de L'achigan, Quebec J0K 3H0; (514) 588-4254



Honda House Motor Speedway, 384 Richmond St., Chatham, Ontario N7M 1P9; John Elliot, (519) 354-5530



Inferior R/C Racers, 311-1780 Springview Pl., Kamloops, BC, V2E 1J4; Martin Vannieuwenhuizen, (604) 374-1268



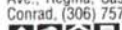
IROCC Off-Road, Hartland Rd., Victoria, B.C., Gary Allen, (604) 478-8004



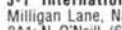
Ivan's Playground, 2220 Dewdney Ave., Regina, Sask., S4R 1H3; Ivan or Conrad, (306) 757-8881



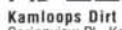
J-T International Raceway, 127 Milligan Lane, Nananee, Ontario K7R 8A1; N. O'Neill, (613) 354-0099



Kamloops Dirt Burners, 311-1780 Springview Pl., Kamloops, BC, V2E 1J4; Martin Vannieuwenhuizen, (604) 374-1268



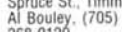
Kiwanis Radio Control Club, 410 Spruce St., Timmins, Ontario P4N 4S7; Al Bouley, (705) 267-1569; fax, (705) 268-9129



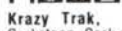
Krazy Trak, 2412 Miller Ave., Saskatoon, Sask.; Brian & Bart Kendel, (306) 221-7344



M&M Hobbies Raceway, 430 McMurphy Ave. S., Unit 1604, Brampton, Ontario L6Y 2N4; Mike, (416) 452-8355



Mackay Track, 1025 W. 14th, North Vancouver, BC; Alan Walrond, (604) 684-8335



Maple Grove R/C Track, RR #3, Brockville, Ontario K6V 5T3; Ray Giroux, (613) 342-5549



MORRAC Raceway, 6449 Crowchild Tr. SW., Box 36060, Calgary, Alberta T3E 7C8; Gary Fliegel, (403) 254-1386



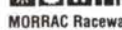
Niagra R/C Speedway, 1874 Hwy. 20, Thorold, Ontario; Steve Ingram, (416) 892-5548



Northern Alberta Scale Car Auto Racers, 1142 Knottwood Rd. E., Edmonton, Alberta, T6K 2J8; Dean Simpson, (403) 461-3432



Quintrax Speedway, Box 1034, Belleville, Ontario K8N 5B6; (613) 962-1414; fax: (613) 962-7306



Radical Raceway, 150 Bradwick Drive, Unit 25, Concord, Ontario L4K 1K8; Roland Glass, (416) 660-5238



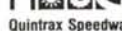
Rousillon Hobby Track, 177-D St-Jean Baptiste, Chateauguay, Quebec J6K 3B4; (514) 698-2151



RROL, Nordon Restaurant, Hamilton Rd. at Commissioners Rd., London, Ontario; Mark Hennion, (519) 457-2758



Seaway Valley R/C Raceway, RR 1, Iroquois, Ontario K0E 1K0; Orville or Carol Smyth, (613) 652-4953



Thunder Alley, 1380 London Rd., Sarnia, Ontario N75 1P8; Rob Smith, (519) 882-3361



Top Qualifier Race Club, McKay Park, North Vancouver, B.C.; Derrick Vandekraats, (604) 985-3948



Union Creek Speedway, 281 Henderson Highway, Winnipeg, Manitoba R2L 1M4; MRCAR c/o Kelvin Community Centre, (204) 667-9186



Universal R/C Speedway, Niagara St., Welland, Ontario; (416) 735-5051



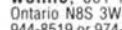
West Coast R/C Raceway, 190-7771 Alderbridge Way, Vancouver, B.C. V5C 3A3; Michael Ma or Kelly Ho, (604) 276-8779



WORRC, 861 Isack Dr., Windsor, Ontario N8S 3W6; Pete Adams, (519) 944-8519 or 974-3346

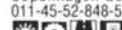


Woodstock Speedway, Queen St., Woodstock, NB; Woodstock Hobby, (506) 325-2067

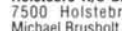


DENMARK

Rainbow Raceway, Enkervej, 9 Glostrup, Copenhagen 2600; P. Christiansen, 011-45-52-848-504

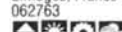


Holstebro R/C Buggy Club, Mozartsvej 7500 Holstebro, Denmark 2600; Michael Brusholt, 011-45-97-412-734

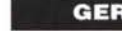


FRANCE

Auto Electron, 35, rue B. de Ventadour, Limoges, France 87000; M. Boudoul, 55 062763



Mini Car Club Dortmund, Kortschstr. 4, 4600 Dortmund 13, Germany; Roland Schwan, 0231/213609



GERMANY

Auto Electron, 35, rue B. de Ventadour, Limoges, France 87000; M. Boudoul, 55 062763

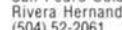


Auto Electron, 35, rue B. de Ventadour, Limoges, France 87000; M. Boudoul, 55 062763



HONDURAS

Autodromo Accion, Quinta Santa Maria, San Pedro Sula, Honduras, Colonia Rivera Hernandez; Eduardo Hondal, (504) 52-2061

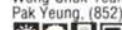


Auto Electron, 35, rue B. de Ventadour, Limoges, France 87000; M. Boudoul, 55 062763

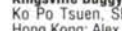


HONG KONG

H.K.R.C. Model Car Racing Club, Wong Chuk Yeung Village, Shatin, N.T.; Pak Yeung, (852) 607-0828

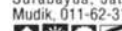


Kingsville Buggy Arena, Lot 2130-2137, Ko Po Tsuen, Sha Tau Kok Rd., N.T.; Hong Kong; Alex Chan, (852) 659-2822



INDONESIA

Beverly's Racing, Palm St., 188, Surabaya, Jatim, Indonesia; Jhon Modik, 011-62-31-595-888



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ISRAEL

Nahshoneat, Abba Nile Silver Str. 64, Haifa, Israel 32809; Golan Levy, (972) 039386444 or (972) 04231252



ITALY

Associazione Modellisti Cossato, via P. Maffei, Cossato 13014, Biella, Italy; Zanelato Romildo, 015-405881, fax 015-922709

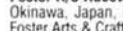


JAPAN

Courtney Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674



Foster R/C Raceway, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674



Hansen Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674



Iwakuni R/C Track, PSC 561, Box 978, FPO AP 96310-0978; David T. Eck, 011-81-6117-53-3662



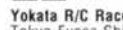
Misawa R/C Raceway, 13th Fighter Squadron, PSC 76, Box 2585, APO AP 96139-2585; 011-81-176-53-5181, ext. 226-6506



Yokota R/C Racers, Yokota Air Base, Yokota Fussa-Shi, Japan 96326; June Uchiyama, 0425-54-6942

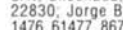


Zama Off-Road Raceway, 17th ASGCM Unit 45013, Box 3232, APO AP 96338 Japan; SFC Ken Campbell, 011-81-3117-63-8478



MEXICO

Alces Off Road, Lopez Mateos y Rayod S/N, Ensenada, Baja California, BC 22830; Jorge Bustamante, (667) 6-1476, 61477, 86729



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NEW LINES: QUANTUM, OFNA, DIE-CAST CARS, 1/24 DECALS**50 NORTH HARRISON AVE., UNIT #14, CONGERS, NY 10920****PANDA NITRO PICKUP***(Continued from page 25)*

body to the "Paint Master General"—Richard Muise of Motion Graphics*. As always, he came up with an outstanding paint scheme—one with custom "burst-through" graphics.

To round out the truck's good looks, Panda supplies rims with a brushed-aluminum finish that are similar to full-size, Toyota 4Runner rims. Full-rib front and five-row rear, spiked, 2.2-inch tires put the power to the ground. They should work on most soft to medium-hard dirt surfaces.

DOIN' THE DIRT

I had been waiting to hit the track; there's nothing like the smell of nitro! Filling the fuel tank and hooking up the glow-plug igniter were the only things standing

between me and a riotous romp. The Magnum started after a couple of tugs on the recoil starter and then idled contentedly. I made a few minor adjustments to the throttle and brake linkage (which looked a little weak to me), and it was time to see whether this Panda was a teddy bear or a grizzly.

I made few warm-up laps to bring the engine up to operating temperature, and then I checked all the trims and tried to get a feel for the truck. The Panda's handling was very nimble (read: twitchy). The truck's lightness enabled it to float over the whoops. It had a great in-flight attitude and only growled when I pushed it beyond its capabilities.

For a price approximating that of any good electric-truck kit, you can share in the new excitement of gas off-roading. This kit is excellent for entry-level dri-

vers who are looking for something different and who don't have a lot of patience for assembly.

**Here are the addresses of the companies mentioned in this article:*

Panda; distributed by Global Hobby Distributors. **Global Hobby Distributors**, 10725 Ellis Ave., Fountain Valley, CA 92728.

JR Remote Control; distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

Airtronics Inc., 11 Autry, Irvine, CA 92718.

Motion Graphics, 2645 Robert Arthur Rd., Westminster, MD 21157.

Power Master Products, 7807-H Telegraph Rd., Montebello, CA 90640.

Thunder Tiger, distributed by Global Hobby Distributors.

Dremel, 4915 21st St., Racine, WI 53406. ■



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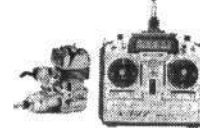
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Battery Basics

by LARRY COLE

Cell Seminar

THE WIZENED OLD MAN stood silently as he stroked his white beard. The light blue fog that swirled around him shrouded the entire room with its haze. A moon- and star-covered cap struggled to cover his shoulder-length white hair, and he wore a long, flowing robe that was covered with the same pattern. A young man stood across from him; they were separated only by a small round table. It supported a glass globe whose colors changed constantly. Underneath the globe, in small letters, were the words, "Made in Hong Kong." "And what is it that you want to know?" the old man inquired. "Sir," the young man asked, "Please tell me

which is better: Sanyo SCRCs or Panasonic P-170s?"

The old man gazed into the ball. A smoky mist whirled about in the glass globe, and it seemed to glow, as if it had a life of its own. Then, as they watched, smoke began to rise from it, and sparks shot out from within. Very faintly, and then growing in volume, a voice called out from the sphere. "I'm sorry, the number you requested is temporarily out of order. Please try again later."

To answer these questions without the aid of arcane forces, I give you this battery guide. I hope it will help you dispel the myth and voodoo that surround batteries, as you journey to find and maintain the best pack.

The Name Game

Conditioned, matched, punched, zapped, supercharged, mashed... Almost every term known to mankind has been used to describe the methods that various battery companies use. The bottom line is that each matcher is trying to:

- isolate bad cells;
- identify the general characteristics of

a battery;

- train or "condition" the cell for maximum R/C use.

Batteries have memory, so they can be trained to deliver the bulk of their power in a certain pattern under a given load. Generally, a 20A discharge rate is used for SCRs and P-170s, and 25 amps is used for SCRCs; some

companies go as high as 30 amps. Also, you want the batteries in your pack to be of equal strength. Your pack is no better than its worst cell, so rematchers make sure that all the batteries in a pack have the same rating. This way, the power is derived evenly from all the cells.

What do the numbers on batteries mean? Do you really need—or want—to know? “Numbers on batteries are misleading; you can make them say anything you want,” states Bruce Aristeo of Maximum Performance Products. “The way to find out what battery is the best is to try different types.”

Why aren't the numbers on the batteries confirmed by your equipment when you check them? “Variance in equipment,” is Bruce's answer.

cutoff point that was used to calculate run time. The industry standard is supposed to be .9 volt per cell. How do you use the numbers (if you believe them)? Let's say that you have two batteries from the same matcher. Both had the same amount of discharge time, and both were discharged at the same rate and at the same charge. The average voltage of one battery, however, is higher than that of the other. With all else being equal, the battery with the higher voltage is better. That

is, of course, if you believe the numbers. A general guide that I use is: if you're happy with the performance of your batter-

ies, then the heck with the numbers.

the numbers game

“There is such a variance in equipment that it's almost impossible for two different machines to give you the same reading. Other factors, such as air temperature, will affect the readings.”

Just out of curiosity, what do the numbers mean? Most batteries have the same information printed on them. (Some have more than others.) Generally speaking, the information indicates:

- A. run time in seconds;**
- B. the discharge rate in amps that was used to calculate the run time;**
- C. the average voltage;**
- D. the charge rate that was used.**

Additionally, some batteries include the



SCRC VS P-170

Which is better: Sanyo 1700 SCRCs or Panasonic P-170s? Or, for that matter, is there any difference? The answer is—the envelope please—it depends! (Now,

how's this for clearing up the battery mystery?) Given that you know what you're doing, both batteries will give you the same result. That's not to say, however, that we all know what we're doing. First, let's examine the batteries up close.

The Sanyo 1700 SCE battery was the first of the 1700s. The SCE had been in vogue with the modified racer, but it had always been in disfavor with the R/C car owner. Although it had a much longer discharge time than the previous 1200s and or 1400s that had been available, it was also very expensive, and it had a relatively short life, owing to its fragile inner design and the high temperatures that it was exposed to during a race. So although it allowed racers to run a lot longer and go a lot faster, its drain on the wallet made it undesirable to many in the racing crowd.

The Panasonic P-170 was the first of the *new generation* 1700 batteries available to the public in large quantities. It replaced the SCE, because the P-170 was designed to give the same—if not more—run time than the SCE, but it lasted twice as long. The key to understanding the P-170 is to remember that this battery was designed by Panasonic for an industrial market first, and the R/C market second.

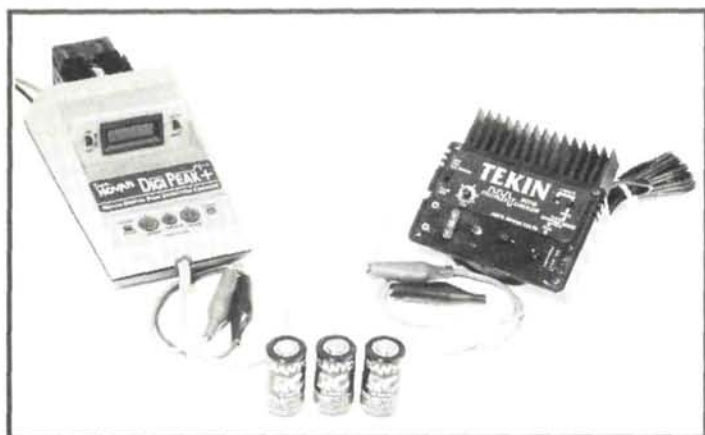
Sanyo, who had cornered the 1700 marketplace with its SCE battery, was quick to realize the SCE's shortcomings. Realizing that racers were disgruntled with the high cost of batteries and their short life, Sanyo engineers set out to create a battery that was specifically for the R/C market. Thus, the SCRC was created. It was designed with the run time of the old SCE and the durability of the 1400 SCR.

Although both the P-170 and SCRC are rated at 1700mAh, there are major differences between the two. Generally speaking, the P-170 offers greater run times than the SCRC, but the SCRC has a higher voltage (more on voltage later). The SCRC can be run twice in one day with hardly any effect on its life (allow it to cool before recharging), whereas the P-170 exhibits an old SCE characteristic of preferring a rest period of about a week between each use. The P-170, however, is less expensive than the SCRC.

How can two different batteries be equal? The answer is simple. With the additional run time of the P-170, you can gear the car to compensate for its lack of voltage. Conversely, the SCRC doesn't need to be geared as much as the P-170, so that makes up for the run time disadvantage. For high-speed oval racing, the P-170 and the SCRC are about equal. For the smaller ovals and off-road, the SCRC is the way to go.



Charge To The Front



Trickle, soft pulse, hard pulse; linear; high amp charge, low amp charge; one charger for one style battery, another for a different style: an R/Cer's nightmare. Actually, it doesn't matter what type of charger you use, as long as it's a constant-current charger. When you charge a pack of batteries, you may see the voltage actually drop. This also happens when you fill the gas tank in your car; when the tank is full, a backup of fuel automatically shuts off the pump. When you use a charger, the power starts to back up, so it's harder for the charger to push the power into the cell.

One problem is that a lot of chargers don't, or can't, continue delivering the same voltage. Another problem is that your power supply can prevent your charger from holding a constant voltage reading if it isn't able to handle the additional draw that the charger needs. What does Maximum Performance Products use

to charge their team car batteries? "A constant-current linear charger with a thermal probe. Most people don't want to be bothered with it [the



probe], but if you're looking for $\frac{1}{10}$ second on a lap, it's what you have to do." Bruce's alternative to the probe is peak detecting—a feature that most chargers have today.

What is the difference between soft pulse charging and linear charging? During soft pulse charging, the charger sends current to the battery in a pulses—on and off in quick succession. A linear charger, by its true definition, charges in a constant pattern.

So now that we know that the use of a constant-current, linear charger promotes long life and performance, the next question is: at what rate should we charge our batteries? Four amps is a good, average starting point for both 1400s and 1700s. Ultimately, however, the track will dictate the charge rate. If you don't use all the power in your battery at a track, you should try to increase the charge rate by a volt to get more power out of your battery (at the expense of duration). Conversely, if you need more duration, decrease the charge rate. The tradeoff here is power. Re-peak 1 amp higher than the rate at which you charged. Racers are cautioned against using "bump boxes." A bump box is a portable charging unit that you may have seen at the tracks. It's hooked up to the car when the car is being staged for the start of the race. With a bump box, if you don't have a ton of capacity in your battery, you'll get an initial surge of power for about the first minute or so, but in the last minute of the race, your pack's voltage will drop considerably. Re-peaking at 1 amp higher than the rate at which you charged gives you the same surge in the beginning, but it doesn't rob the power from the end. Charging the Panasonic 1700 over 4 amps is not recommended, because its internal design is similar to the old Sanyo SCE.

What should you do with your batteries after you've run them a number of times? Rematch them yourself? Send them out? On the subject of P-170s, whatever you do, don't try to rematch them as single

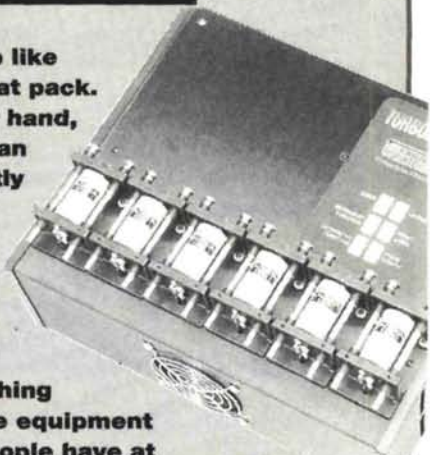
cells. The P-170s exhibit a "clan-like" nature. Once they've been put in a pack,

Got A Match?

they seem to like staying in that pack.

On the other hand, the SCRCs can benefit greatly from rematching.

There are many good people out there who offer rematching services. The equipment that most people have at home to rematch their own batteries is really not the best in the world to use.



throw it in reverse

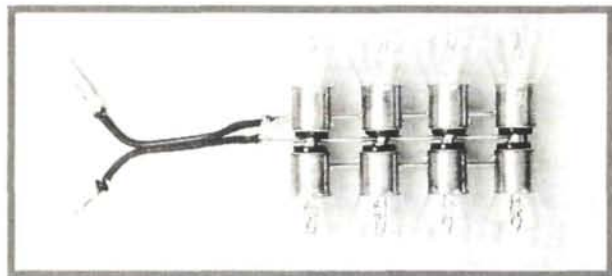
Battery reversal? Does this really happen if I discharge my batteries incorrectly?

Does this mean that negative is now positive, and positive is negative? The answer once again is: it depends. (I told you we would get to the bottom of all your battery questions!) Panasonic batteries can reverse. Sanyo batteries can't.

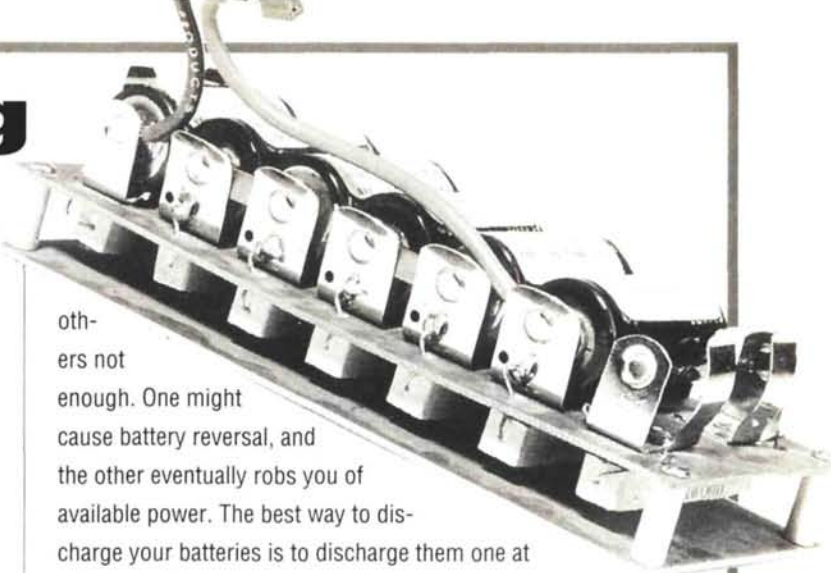
A Sanyo can go into negative voltage, which most people think is battery reversal, but it isn't. It simply means that the battery is discharged to that point. A true reversed cell occurs when the cell actually reverses polarity. Positive becomes negative, and negative becomes positive. You can charge a reversed cell, but it just won't have any power (a minor detail indeed).

discharging

How should you discharge your batteries? To what point should you discharge them? Once again, there are many theories, but most experts agree that whenever you're discharging by the pack, any method you use is bad. The problem is that all cells don't discharge equally. If you use a discharge rate cutoff, you may drain some batteries too low and



others not enough. One might cause battery reversal, and the other eventually robs you of available power. The best way to discharge your batteries is to discharge them one at a time—cell by cell—to a set cutoff rate. If you don't have the time or the inclination, however, then discharge them to a "safe" cutoff point of 6 to 6.7 volts for the average 6-cell pack. This should allow an adequate margin to prevent cell reversal.



Do batteries have memories? Like elephants, can they remember? The answer is yes, they can. (They're just lighter than elephants.) If you doubt this, take a pack of batteries that you've been using in off-road and try running them in a race of longer duration. You'll find that you have a lot of power until the middle of the race, but all of a sudden, a cruise-control type of

mode will kick in. The batteries won't have any punch, but they'll seem to run forever. If you run a pack of batteries that are used to running races of longer duration, you'll have a nice curve of power. The batteries have trained themselves to deliver all of their available power in four minutes, and when you try to run them in a 8-minute race, they flatten out. So, remember the memories.

ONCE UPON A TIME, IT WAS...

Do SCE 1700s fade into the sunset—never to be seen again—or is there truth to the rumor that as an SCE loses duration, its voltage increases? Well, believe it or not, an old SCE 1700's voltage will start to increase as it gets older.

However, don't get your hopes up too high; your old SCE 1700s won't replace your 1400s. While the SCEs will gain voltage, they won't ever catch up to the voltage available in a good 1400 pack.

When all is said and done, there are some simple rules for selecting and maintaining your batteries. I hope that this guide has answered many of your questions, and that it helps to make your next battery purchase a little easier on your mind and your wallet!



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LETTERS

(Continued from page 9)

FREEZE-DRIED VOLTAGE

For about a month, I've owned an RC10T that's powered by a Reedy Force 1 motor. I recently checked the brushes and saw that they have grooves in them that weren't there when my motor was new. What's causing this? Will it damage my motor, and what can I do to prevent it from happening again?

My second question is about my battery pack. After a run, my battery pack is very warm; I get tired of waiting for it to cool off naturally for charging, so I throw it into the refrigerator for a couple of minutes. Will this damage my pack, or do I have to wait forever for it to cool off so I can charge it? Keep up the great work!

JARVIS MUSCHAMP

Los Angeles, CA

If you look into the motor at the commutator, you'll probably notice that there are grooves on the comm as well as on your brushes. Your brushes are scratched because dirt has pitted the surface. To prevent this from happening, give your motor a blast of motor spray after every run, especially if you run in really sandy conditions.

As for your refrigeration question: we prefer to let our batteries cool naturally. We're not too sure whether you're damaging your cells or not, but we think it's best to let the cells cool to the ambient temperature and give them enough time to recover before recharging them.

JH



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